PARK CITY
1884

Office of City Manager

March 3, 2009

VIA FEDERAL EXPRESS OVERNIGHT
Carol Campbell, Assistant Regional Administrator
US EPA REGION 8
8OC-EISC
1595 Wynkoop Street
Denver, Colorado 80202-1129

Dear Ms. Campbell:

This letter will serve as my introduction. I am the City Manager of Park City Municipal Corporation (PCMC). I am writing to you to update you on the status of EPA's progress in and around Park City and also to frame issues for our upcoming March 9, 2009, meeting in Salt Lake City with representatives of the Utah Department of Environmental Quality (UDEQ) and United Park City Mines Company (UPCMC). This letter is supported by a separate three ring binder of exhibits which are referenced herein.

I would like to begin by emphasizing how pleased PCMC has been with the many successes that have resulted from its collaborative relationship with EPA. The first part of this letter will provide a brief overview of some of those successes. Following that, I will update you on the status of current events by way of a chronology of relevant events, documents and correspondence. I will close the letter by framing the issues that the Mayor, a Park City Councilmember and PCMC staff would like to discuss with you on March 9, 2009.

A. Successful Environmental Remediation in Park City

PCMC and the residents of Park City and the surrounding areas have for a long time been committed to remediating the impacts of our mining history. This commitment has resulted in numerous successes and water quality improvements within the watershed. These successes derive mainly from the cooperative efforts of PCMC, UDEQ, and EPA.

For example, on January 19, 2000, PCMC agreed to enter into the State of Utah Voluntary Cleanup Program (VCP) to remediate a portion of the Marsac Mill property and develop it into the Intermodal Transit Center. This is located in the heart of Old Town Park City immediately adjacent to City Hall. Pursuant to negotiations with EPA, PCMC decided that the VCP was the best means of remediating the site and resolving EPA's concerns, even though it came with a cost of $800,000 for disposal of regulated soils to the Park City taxpayer.[1] As a result, the Park

[1] Exhibit Tab-12 Transit Center Disposal Cost

City Intermodal Transit Center serves as a critical transportation hub for Park City and the Snyderville Basin.

The remediation of the Marsac Mill site expanded with the construction of the China Bridge Parking Expansion in 2006; that project followed the same remediation protocol as used for the Intermodal Transit Center. The structure now provides two-hundred and fifty additional parking spaces in downtown Park City.[2]

Another example of success through cooperation came with the implementation of the Soils Ordinance Environmental Management System (EMS) which was implemented on November 9, 2004.[3] This program established remediation goals and created procedures, monitoring protocols, a means for educating the public, and controls for containing soils impacted with mine tailings. The EMS program was adopted by resolution and funded by PCMC City on April 15th 2004. Furthermore, to comply with the requirements of the EMS, PCMC revised the "Park City Landscaping and Maintenance of Soil Cover Ordinance."[4] It is important to note that EPA used this program as a model for the Lilly Montana project, where components of it were implemented. Additionally, UDEQ awarded the educational component of this program with the 2005 Pollution Prevention Awareness Award and Environmental Systems Research Institute has published three different articles on this program. The annual responsibilities of the EMS include the following:

a. Lot Risk Assessment
b. Non-Compliant Lot Enforcement
c. Goal to Remediate 15 lots per year until 100% compliance.
d. Education and Outreach
e. Soil Sampling and Monitoring
f. Worker Health and Safety
g. Prospector Drain Biocell Operation

Another successful remediation occurred in 2008 with the full remediation of the Alice Lode Brownfield Site,[5] which was assessed in 2003 under an EPA brownfield assessment grant. Due to that assessment, PCMC and King Development Group, LLC, a private third party, entered into a VCP with the UDEQ for the Alice Lode Brownfield Site, located immediately south of downtown Park City. The site is comprised of 10.17 acres with 8.63 acres being owned by King Development Group and 1.54 acres owned by PCMC. The site was previously a silver mining claim that was operated from 1920 to 1935 and contained lead levels as high as 16,400 ppm. After remediating the site in accordance with the VCP work plan, it is anticipated that UDEQ will issue a No Further Action Certificate in 2009. It is critically important to recognize the positive influence on the Silver Creek watershed that resulted from the remediation of the Alice Lode Brownfield Site.

[2] Exhibit Tab 13-Marsac Mail CERCLIS Parking Garage Expansion
[3] Exhibit Tabs 1, 2, 3 & 4-Environmental Management System Approval
[4] Exhibit Tab 5-Building Code 11-15 Soils Ordinance
[5] Exhibit Tab 10 & 11

Today, remediation within Park City continues within the Soils Ordinance boundary.[6] Over 700 properties within the ordinance boundary have been successfully remediated and now contain less than 200 ppm lead.7 This translates to over 95% of property within the ordinance boundary – all of which was to be listed on the NPL in the mid-1980's – achieving compliance with both UDEQ and EPA standards. To facilitate compliance, PCMC implemented incentive programs such as the Top Soil Assistance Program which, to date, has allocated over $32,000 to property owners to cap residential lots.[8]

In 2008, PCMC learned that its Park City Storm Water Management Plan significantly reduced the city's phosphorous contribution to the East Canyon Creek watershed.[9] This accomplishment is documented in the East Canyon Watershed Sub-Basin Water Quality Monitoring Results. That report describes how PCMC has significantly reduced the level of contaminants (phosphorous and total suspended solids) in the East Canyon Creek watershed. This is especially significant in light of the fact that in 2000, PCMC was identified as a contributor of nearly 50% of the total phosphorous load within the East Canyon Creek watershed; that figure is now 18%. PCMC attributes the improvement in the East Canyon Creek water quality to its Storm Water Management Plan that went into effect in 2002. The plan was responsible for requiring construction site Best Management Practices, retention/detention basins as well as other engineering controls to mitigate non-point source pollution. Furthermore, PCMC planted, with the assistance from the Weber Basin Job Corps, over 6,100 trees within the East Canyon Creek headwaters. This area has been designated as permanent buffer riparian habitat, comprising over 30 acres of buffer which is needed for controlling non-point source pollution. The improvements of this area also included the installation of numerous revetments and over 1,000 lbs of native seed mix being hand-broadcasted within the buffer area. The PCMC Storm Water Management Plan is frequently used as a model by UDEQ and is distributed to Utah municipalities as a template for storm water management plans seeking compliance with the Clean Water Act Phase II Rule. The specifics of PCMC storm water annual reports may be viewed at http://mapserv.utah.gov/ParkCityGIS/.

Directly related to Silver Creek watershed in 2008, PCMC constructed the Prospector Drain Biocell at a cost to the tax payers of $450,000.00.[10] The biocell is fully operational and brings Silver Creek water into compliance with the Silver Creek TMDL endpoint goals. PCMC constructed the system with oversight from Dr. Fitch from the University of Missouri Science and Technology and David Reisman, USEPA's Director of the Office of Research and Development Engineering Technical Support Center and National Risk Management Research Laboratory. As previously stated, the biocell treatment is treating water below the TMDL endpoint goal for zinc and cadmium and is a model for other watersheds to utilize. It is one of a kind horizontal treatment system and will be recognized at the 2009 National Meeting of the

[6] Exhibit Tab 6
[7] Exhibit Tab 7
[8] Exhibit Tab 8
[9] Exhibit Tab 14
[10] Exhibit Tab 9

American Society of Mining and Reclamation, Billings, MT, under the heading Revitalizing the Environment: Proven Solutions and Innovative Approaches.[11]

PCMC is very proud of our environmental accomplishments that have benefited both the East Canyon Creek and Silver Creek Watersheds. PCMC believes these programs and efforts have protected our residents and visitors. EPA has also recognized these successes by using PCMC as an example in the 2008 publication "Integrating Water and Waste Programs to Restore Watersheds - A Guide For Federal and State Project Managers". This guide can be found at the following URL: http://www.scribd.com/doc/1826308/Environmental-Protection-Agency-crossprogram.[12]

Perhaps the most successful collaboration between PCMC and the EPA came with the formation of the Upper Silver Creek Watershed Group (USCWSG) in 1999. As discussed more fully throughout the remainder of this letter, the USCWSG was formed by EPA, UDEQ, PCMC, UPCMC, and others to help EPA collaboratively address Superfund-related environmental issues in the Park City area. From its inception a decade ago, when the shareholders engaged the services of a mediator and shared in the cost, the USCWSG has been committed to resolving environmental hazards from the top of the Silver Creek watershed to the Richardson Flat Tailings Site (RFT Site) and beyond. Significantly, it was the USCWSG that agreed with EPA to address the RFT Site as an "NPL-equivalent site." Thus, in keeping with its commitment to collaboration with other stakeholders as the best means of achieving successful environmental remediation – as experienced with the Alice Lode Brownfield Site, the Intermodal Transit Center, and the China Bridge Parking Expansion discussed above - PCMC is similarly committed to continued collaboration with EPA to complete the remediation of the watershed.

PCMC, however, learned in early December, 2008, that EPA intended to pursue a different course in the remediation of the RFT Site and the area immediately down-drainage from that site known as Lower Silver Creek. Before returning to this point, it would be helpful to provide some background.

B. Background and History

On September 28, 2000, EPA and UPCMC entered into an Administrative Order on Consent (AOC). This AOC called for UPCMC to complete a Remedial Investigation/Focused Feasibility Study (RI/FFS) at the RFT Site. The RI/FFS, in turn, provided the information forming the basis of the July, 2005, Record of Decision (ROD) for the RFT Site.

The July, 2005 ROD for the RFT Site acknowledges the success of the USCWSG and emphasizes the importance of community participation in the remediation process. In fact, EPA proposed placing the RFT Site on the NPL in 1988 and 1992 and on each occasion EPA declined to do so, due in large part to the input of the public; the Park City community clearly did not want RFT listed as a MPL. The unequivocal public input culminated in the USCWSG and EPA

[11] Exhibit Tab 9
[12] Exhibit Tab 15

agreeing to address the RFT Site as an "NPL-equivalent" site, whereby the remediation would be accomplished using the same process that is required for a site listed on the NPL. The ROD also points out that the efforts of the USCWSG allowed EPA to employ increasingly reduced oversight of the RI/FFS leading to the creation of the ROD.[13]

The ROD explains that the RFT Site is one of several historic mining sites in the Upper Silver Creek Watershed and states that past and present impacts to surface water and sediment in Silver Creek result from the cumulative contributions of these sites over decades. Based on these impacts, EPA has consistently sought to investigate and remediate the upper Silver Creek Watershed as a whole, rather than trying to investigate each site separately. This approach ensures that remedies selected for the individual sites are complementary to each other and work toward the goal of cleaning up the entire watershed. In short, the scope and goal of the response action has always been to clean up the entire Silver Creek watershed by working from top to bottom. EPA determined as early as the mid-1980's – when it first discovered the RFT Site – that sites upstream of the RFT Site, such as Empire Canyon and Prospector Square, had impacted surface water and sediment conditions at and below the RFT Site. In fact, Silver Creek flows into the northern portion of the wetlands at the RF site. At the same time, the ROD and its supporting Administrative Record address at great length the need to mitigate the contribution of metals from the RFT Site back into Silver Creek.

In 2001, UDEQ completed an assessment of Lower Silver Creek. UDEQ's assessment generated a fairly comprehensive characterization of the soil in that area.

While PCMC believes it is important to mediate the Lower Silver Creek, it is important to recognize the original Development Agreement for what became the Empire Pass Project was executed May 17, 1994. It states the following: "Additionally, developer shall reclaim all mining and mining overburden sites within Flagstaff Mountain, in accordance with state and federal regulatory agency review."[14]

In December, 2003, EPA and UPCMC entered into an Administrative Order on Consent for Non-Time Critical Removal Action in Empire Pass (Empire Pass AOC). This AOC requires UPCMC to perform the Removal Action set out in the 2003 Empire Canyon Action Memorandum. It also requires UPCMC to create a proposal for post-removal site control measures and to provide quarterly progress reports to EPA. UPCMC is also required to give buyers of its property in Empire Canyon written notice that the property is subject to the Empire Canyon AOC and that subsequent owners must agree to allow EPA access to the property. UPCMC's responsibilities under the AOC survive the conveyance of UPCMC's real property to third parties. Significantly, while the Findings of Fact acknowledge that stormwater and snowmelt may impact surface water, the AOC is silent as to the impacts on groundwater in spite of the fact that EPA had already identified the Judge Tunnel – a groundwater source - as a collection structure for water infiltrating it from the Empire Canyon Site.

[13] Exhibit Tab 18
[14] See Development Agreement Section 2.2.1.6

On May 5, 2005, PCMC and Talisker entered into a Memorandum of Understanding for the purpose of memorializing their agreement with respect to the disposal of Bevill-exempt mine waste in the RFT Site. Talisker agreed to allow the disposal of Bevill-exempt mine waste and impacted soils in the RFT Site for as long as Talisker keeps that site open.

It is the City's understanding, that in September, 2006, EPA entered into the Agreement and Covenant not to Sue DV Luxury Resort LLC Agreement with Athens Group (the developer of the Montage Hotel in Empire Pass). Pursuant to this agreement, Athens Group paid roughly $38,000 to EPA in exchange for EPA's promise to not sue Athens Group for any impacts resulting from depositing regulated soils and/or tailings at the RFT Site. Also in September, 2006, EPA signed off on the Construction Work Plan for Montage Hotel in Empire Canyon. This document provided procedures which were to be followed by the developer while constructing the hotel.

Nonetheless, PCMC Staff in August, 2008, submitted to the Planning Commission recommendation that were approved and required amendments to the Mine Soil Hazard Mitigation Plan (MSHMP) for UPCMC's Empire Pass Development.[15] The MSHMP is required to include a Memorandum of Understanding between UPCMC and the Utah Department of Oil, Gas and Mining (DOGM). The goal of the MOU is to regulate the mitigation of mine hazards and impacts within the Empire Pass Project as if UPCMC had obtained a mine operating permit from DOGM and was under that agency's jurisdiction.[16]

In March, 2008, Summit County enacted Ordinance 692. This ordinance created an overlay zone for the Lower Silver Creek area. The ordinance requires anyone who wishes to develop within Lower Silver Creek to obtain a soils study to characterize generated soils. The developer must then propose a plan to remediate any environmental problems or violations identified in the soils study to the satisfaction of UDEQ and EPA before Summit County will grant a development permit. The ordinance also provides that identified soils issues may be remediated through UDEQ's Voluntary Clean-Up Program (VCP). The ordinance also advises landowners within Lower Silver Creek that once the EPA's study on the Lower Silver Creek area is completed, the property owners "shall be required to remediate under the terms identified in the EPA Study and shall have a limited time in which to do so." Finally, the ordinance provides that remediation "may be executed through any other clean-up plan approved in advance and in writing from UDEQ, EPA and Summit County."

At a November 24, 2008 meeting with PCMC's Water Department, EPA advised PCMC that its proposed raw water pipeline is located in an existing CERCLIS site, namely Lower Silver Creek. USEPA's Remedial Project Manager suggested several remediation requirements at that meeting, including the removal and/or capping of tailings in both dry and water-prone areas. This marked the first time PCMC learned that EPA identified Lower Silver Creek as a CERCLIS site.

[15] Exhibit Tab 17
[16] Exhibit Tab 16-Letter to Kathy Hernandez on April 20, 2007

In January, 2009, EPA informed PCMC that it intended to regulate the discharge from UPCMC's snow melter. The snow melter was located at UPCMC's Ontario Mine and is being used to melt snow removed from Empire Canyon. The water discharged from the snow melter exceeds the TMDL limits for zinc.

C. Park City's Position

PCMC's position can be distilled down to one simple request: Let's stay on the course we started ten years ago. PCMC's collaboration with EPA and other stakeholders to date has resulted in unqualified successes. Almost ten years have passed since EPA declared that the Silver Creek watershed needed to be remediated from the top of the drainage to the bottom. PCMC committed to support EPA's approach then and has done so for nearly a decade. The rationale for that approach, as expressed in many EPA documents including the RFT Site ROD and the Empire Pass AOC, is as sound today as it was at the time the USCWSG was formed. It is the same reason the Bureau of Land Management does not want to remediate its property as long as Silver Creek continues to load pollutants which would recontaminate its property. There is no justification, compelling or otherwise, to divert from a course of action that has achieved so many of the goals set by EPA in cooperation with the Park City community.

It is PCMC's hope that EPA will take the time to consider the many ways in which USCWSG demonstrated its reliance on EPA's continued clean-up of the watershed from top to bottom. From the 2003 Empire Canyon Action Memorandum to the 2005 RFT Site ROD and the Empire Canyon AOC and the Memorandum of Understanding between PCMC and UPCMC to the 2006 Construction Mitigation Plan for the Montage Hotel in Empire Canyon, the stakeholders have maintained an expectation that EPA would follow its prescribed plan. Shifting focus to Lower Silver Creek this far into a process (that is working!) will undoubtedly undermine the intent and purpose of the USCWSG. The fact that both the UDEQ assessment of Lower Silver Creek and the subsequent formation of the LSCWSG preceded the execution of the RFT Site ROD clearly indicates that EPA did not intend to address Lower Silver Creek before the completion of the Upper Silver Creek remediation. It makes perfect sense to allow the LSCWSG to continue to address Lower Silver Creek issues. EPA's proposed change of course would supplant LSCWSG's efforts while simultaneously hampering the ongoing and successful process in Upper Silver Creek.

Furthermore, Park City believes that the proposed amendment to the ROD to include Lower Silver Creek so fundamentally changes the ROD that the requirements of NCP § 300.435(c)(2)(ii) are triggered. In material part, this provision requires a period of public comment before a decision is made to amend the ROD. *See* NCP § 300.435(c)(2)(ii)(A-H). The proposed addition of Lower Silver Creek clearly exceeds a *non-significant* or significant change to the ROD. NCP § 300.435(c)(2)(i). It is a change that will "fundamentally alter the basic features of the selected remedy with respect to scope, performance, or cost." NCP § 300.435(c)(2)(ii). Thus, amending the RFT Site ROD should not occur without the opportunity for public comment.

It is critically important to take note of the fact that the RFT Site ROD and its supporting documents are replete with the role that public participation had in keeping the RFT Site off of the NPL. To now classify the enormous impacts of adding all of Lower Silver Creek to the RFT Site as something short of a fundamental change would swiftly and silently annihilate the community's long-running participation in the creation of the ROD as well as its commitment to the USCWSG.

While Park City strongly feels that this change is fundamental within the meaning of NCP § 300.435(c)(2)(ii), if EPA determines otherwise, Park City requests that additional public comment periods be held. EPA may, pursuant to NCP § 300.825(b), hold additional public comment periods "after a decision document has been signed on any issues concerning selection of the response action." As noted in EPA guidelines, an additional public comment period "may be useful where there is considerable public or PRP interest in the matter." EPA, *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* 7-5 ¶ 2. This guideline would certainly apply to the action EPA now proposes.

I will close by restating how much I appreciate the proactive and effective relationship PCMC has enjoyed with UPCMC. I would like to continue to build on our successes. Toward that end, please consider returning to the idea of employing a mediator to help us work through what I have discussed in this letter. PCMC would, of course, be happy to share in the cost of such an individual.

I look forward to meeting you on March 9th in Salt Lake City.

Sincerely,

PARK CITY MUNICIPAL CORPORATION

Tom Bakaly, City Manager

cc: Mayor Dana Williams (w/attachments)
City Council Members: Liza Simpson (w/attachments)
Candace Erickson
Roger Harlan
Joe Kernan
Kim Heir
PCMC: Ron Ivie
Tom Daley
Jeff Schoenbacher

EPA: Kathy Hernandez

Mia Woods
Maureen O'Reilly
Kathie Atencio
John Dalton

UDEQ: Brent Everett
Duane Mortensen
Mo Slam

UDWQ: John Whitehead

encls.

TAB #1

Poor Quality Source Document

The following document images have been scanned from the best available source copy.

To view the actual hard copy, contact the Region VIII Records Center at (303) 312-6473.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466

September 29, 2003

Ref: 8EPR-SR

Mr. Jeff Schoenbacher
Park City Municipal Corporation
PO Box 1480
Park City, UT 84060

RE: DRAFT Park City Environmental Management System (EMS) dated August 18, 2003

Dear Jeff:

We are writing on behalf of both the U.S. Environmental Protection Agency (EPA) and the Utah Department of Environmental Quality (UDEQ) to convey our approval of the draft Park City Environmental Management System (EMS) dated August 18, 2003. As a team comprised of both regulators and many local stakeholders, we have worked for several years now to reach this point. We appreciate Park City's work and commitment to reach resolution on this important issue.

different site

Several years ago, we put forth EPA's and UDEQ's remaining concerns regarding the Soils Ordinance and the issues that we felt prevented us from archiving the Silver Creek Tailings Site from the CERCLIS database. Our initial recommendation to address many of these concerns was to conduct an EPA funded blood lead study. While we still believe this approach would be economical, limit future management needs, and provide the most definitive data for CERCLIS archival, we also feel the EMS sufficiently addresses all of our concerns, either directly through changes in the Ordinance or through planned data collection. We recommend the EMS be finalized and that Park City begin implementation. Collectively, we will evaluate data as it becomes available over the upcoming months with the goal of archiving the Silver Creek Tailings Site. As we've discussed, archival is contingent upon: (1) Park City implementing all aspects of the EMS as drafted, (2) getting sufficient numbers of volunteers for sampling, and (3) the results of the sampling.

We look forward to continuing to work with you on issues within the Upper Silver Creek Watershed and beyond.

Sincerely,

Jim Christiansen
Remedial Project Manager
U.S. EPA Superfund Remedial Program

Ty Howard
Section Manager, DERR
Utah Department of Environmental Quality

TAB #2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 200
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

Ref: 8EPR-SR

Mayor Dana Williams
PO Box 1480
Park City, UT 84060

February 8, 2006

Dear Mayor,

EPA is pleased to inform you that the Silver Creek Tailings Site (Site) has recently been archived from the Superfund database. This is a result of the development of the Environmental Management System and the Soils Ordinance Program by Park City Municipal Corporation (PCMC). EPA recognizes that PCMC and the local community have been dedicated to creating and maintaining an institutional control program that will protect Prospector residents for many years to come.

PCMC and EPA developed a cooperative working relationship that facilitated this very important milestone. This effort began in the 1980s when EPA's involvement in Park City was met with several obstacles that prevented the initiation of cleanup in the local area. In 1986, a rider to the Superfund Amendments and Reauthorization Act specifically removed and exempted the Site (or Prospector Square) from proposal for the National Priorities List. To address environmental concerns, and to overcome obstacles that were preventing response actions in the area, PCMC agreed to continue environmental investigations and to institute various institutional controls (ICs) at the Site, including adoption of a local ordinance. This resolution was acceptable to EPA and Utah Department of Environmental Quality pending successful implementation of the ICs. After years of hard work EPA feels PCMC and the local community have reached this goal.

The action of archiving Silver Creek Tailings from the EPA database means that EPA has agreed that "no further Superfund work is anticipated" at the Site. EPA feels confident that PCMC will continue to implement the Ordinance into perpetuity and we are aware that there are approximately 25 properties in the current EMS boundary that will need to be in compliance over the next two seasons.

Once again, EPA congratulates you on the successful implementation of the Soils Ordinance Program and your dedication to solving the environmental issues that exist in the Park City area. We look forward to our continued collaboration in the Silver Creek Watershed.

Sincerely,

Peggy Churchill

Peggy Churchill
Remedial Project Manager

TAB #3

TAB #4

Park City Soils Ordinance Boundary

PARK CITY MUNICIPAL CORPORATION

SOILS ORDINANCE AREA ENVIRONMENTAL MANAGEMENT SYSTEM

2008 ANNUAL REPORT

January 5, 2009

Prepared by: Park City Municipal Corporation (PCMC)
445 Marsac Avenue
P.O. Box 1480
Park City, Utah 84060-1480
Jeff Schoenbacher, Environmental Coordinator
(435) 615-5058
jschoenbacher@parkcity.org

Submitted to: Utah Department Environmental Quality
168 North 1950 West
Salt Lake City, UT 84114
Mo Slam, Project Manager
(801) 536-4282

United States Environmental Protection Agency
Region 8
999 18th Street
Suite 500
Denver, CO 80202
Kathy Hernandez, Project Manager
(303) 312-6101

TABLE OF CONTENTS

Addendums

1.0 INTRODUCTION:

In a cooperative effort with the Utah Department of Environmental Quality (UDEQ) and the United States Environmental Protection Agency (USEPA), Park City Municipal Corporation (PCMC) has agreed to the implementation of an Environmental Management System (EMS) that further protects human health and the environment within the Soils Ordinance Area. The established goals of the EMS were to define the environmental procedures, monitoring, education, and controls for containing soils impacted with mine tailings. The EMS program was adopted by resolution on April 15th 2004 and funded by the City Council[1]. Furthermore, due to the requirements within the EMS, the City Council approved revisions to the "Park City's Landscaping and Maintenance of Soil Cover Ordinance"[2] in order to support the EMS.

This annual report represents PCMC 2008 Annual Report that documents the obligations which the City agreed to submit to USEPA and UDEQ in order to summarize the annual EMS benchmarks.

2.0 SOIL MITIGATION COMPLIANCE PROGRAM

Addendum 1 is the current compliance map for all properties within the original soils ordinance boundary. The lots identified in red are properties that have been capped and are considered compliant with the ordinance. The lots identified in black, are properties that have either not been sampled or have been sampled and are under enforcement. Finally, the properties identified in yellow are units that were capped during the Improvement District time frame and for the most part are unoccupied lots. The original ordinance boundary has 294 residential lots and to date there remain 11 properties that have yet to be sampled or capped with 6" of acceptable cover. As a result, there are 283 lots that have been capped and sampled to validate compliance with the ordinance and subsequently a Certificate of Compliance has been issued.

The EMS proposal has an established goal of capping 15 lots per year. Similar to last year, that goal was exceeded this year, resulting in 21 properties issued "Certificate of Compliance" documents that verify the installation of a clean topsoil cap and cover that has tested <200 ppm lead. The majority were remediated in accordance with the conventional landscaping standard of 6" of clean topsoil substrate and acceptable cover to protect the substrate. Typically, there continues to be many property owners that prefer the combination of the xeriscape and conventional landscaping standard. The xeriscape standard within the soils ordinance was a 2004 revision to encourage water conservation practices. There were some owners that went even further with the xeriscape standard by installing a 6" clean top soil substrate along with a weed barrier fabric, and 6" of bark or rock. It should also be noted, that the repository at Richardson Flats continues to be an invaluable resource for property owners that are concerned with the financial impacts of disposing of soils within a permitted landfill ($157/ton – trucking $650/load). Since having access to the repository, many owners have removed berms containing mine tailings as well as choosing to excavate an additional 12" to 16" of impacted soil in order to accommodate clean topsoil to re-certify the lot. All of these owners utilized the repository for disposing of generated soils to achieve compliance with the soils ordinance standards.

The sampling protocol for a property seeking compliance remains the same; composite samples are procured from the front, back, and both sides of the dwelling. The samples are then submitted under a Chain of Custody to Chem Tech-Ford Laboratory (State Certified) and

[1] Tab 1 – Council Resolution - 4/15/04
[2] Tab 2 - Chapter 15 – 11-15-1 Building Code

analyzed for total lead. Upon receiving the final lab report revealing that the lead levels are <200 ppm lead, the property is considered compliant and a Certificate of Compliance is sent along with a sampling narrative, results report, site map, and Homeowner BMP Brochure. Table 1.0 represents the lots that were capped this year[3] and subsequent lead concentrations:

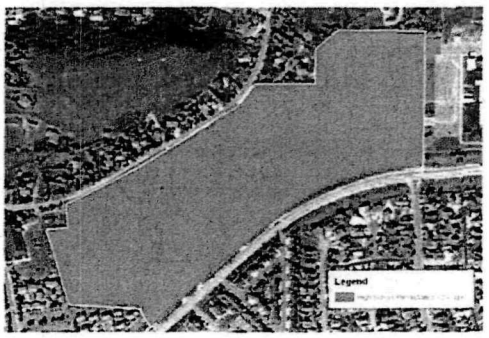
Table 1.0 CAPPED LOTS

Date	Address	Landscaping Type	Average lead Concentration
3/4/2008	780 MAIN ST #4101	Conventional	29.68
5/14/2008	333 MAIN ST	Conventional	13.83
07/25/08	1053 IRONHORSE DRIVE	Xeriscape	No Sample
07/25/08	1160 PARK AVENUE	Xeriscape	No Sample
6/23/2008	1630 SHORT LINE RD	Conventional	30
6/23/2008	2300 COMSTOCK DR	Conventional	92
6/23/2008	2557 GERONIMO CT	Conventional	108
7/11/2008	Wood Side Avenue	Conventional	40.80
7/14/2008	201 HEBER AVE #506/606	Conventional	32.03
7/25/2008	1064 PARK AVE	Conventional	41
7/25/2008	2180 MONARCH DR	Conventional	128.5
8/19/2008	2274 DOC HOLIDAY DR	Conventional	35.75
8/19/2008	2252 SAMUEL COLT CT	Conventional	31.33
8/19/2008	2775 ANNIE OAKLEY DR	Conventional	111.33
9/2/2008	2730 SIDEWINDER DR	Conventional	98
9/2/2008	148 MAIN ST	Conventional	36
9/15/2008	175 WEST SNOW'S LANE	Conventional	78.61
9/15/2008	2273 SAMUEL COLT CT	Conventional	65
9/25/2008	1750 KEARNS BLVD	Conventional	45.57
10/8/2008	1150 DEER VALLEY DR #1001	Conventional	20.93

3.0 REVISED SOILS ORDINANCE - ADOPTED 06-27-2006

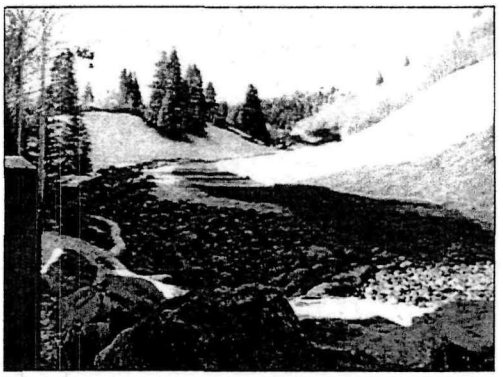
There were no revisions to the "Landscaping and Maintenance of Soil Cover Ordinance" found within Park City Building Code Chapter 11-15 this year. As mentioned in last year's annual report, the ordinance was expanded to include the Park City High School (PCHS) complex. This year, this property completed remediation and the following is the current compliance map for PCHS complex. Sections depicted in red have been capped and tested under 200 ppm lead as stipulated within the AMEC report that was submitted to the Building Department.

[3] List includes lots within the original and expanded ordinance area.



As mentioned in the 2007 Annual Report PCMC and King Development Group, LLC entered into the Voluntary Clean-up Program (VCP) with the Utah Department of Environmental Quality for the Alice Lode Mining site located off of King Road. The Alice Lode Mining Claim comprises of 10.17 acres with 8.63 acres being owned by King Development Group and 1.54 acres owned by Park City Municipal Corporation (PCMC). The site was previously a silver mining claim that was operated from 1920 to 1935. PCMC successfully obtained Brownfield grant funding in 2003 resulting in a United States Environmental Protection Agency (USEPA) Targeted Brownfield Phase II Assessment being completed for this property.

The assessment revealed heavy metal contamination consistent with mine tailings exceeding USEPA's Risk-Based Concentrations for residential and industrial property. The Risk-Based Concentrations are thresholds that USEPA has determined to be protective to human health and the environment for given pathways and naturally occurring background concentrations in the Park City area. This year the Alice Lode was remediated in accordance with the work plan and it is anticipated that a No Further Action Certificate will be issued in 2009. PCMC anticipates that the removal of heavy metal contamination from the Woodside Gulch will have a positive influence on the Silver Creek Watershed. Picture 5 depicts the remediated site with appropriate storm water controls installed.



Picture 1: Alice Lode Site.

Finally, it is also important to reiterate, the following ordinance standards that were adopted in 2004 that are currently applicable for all lots within the boundary:

- Acceptable cover was expanded from just grass and vegetation cover to include xeriscape-landscaping practices. Specifically the standard requires a weed barrier fabric and 6" of rock or bark.
- Soils are strictly prohibited from being transported or reused outside the Soils Ordinance Boundary.

- Soils being disposed of are to be characterized for arsenic and lead and disposed of within a permitted facility depending on the TCLP characteristics.
- The reuse of soils within the Soils Ordinance Boundary is allowed providing the area is capped and the Building Department pre-approves the site.
- The boundary was redrawn to exclude Chatham Crossing due to PCMC, USEPA, and UDEQ concurring that the area does not pose a threat to human health or the environment. This was based on evaluating several years of soils data that further substantiated this claim.
- The boundary has been expanded to include the Transit Center and the CERCLIS Marsac Mill Site. The purpose of including the Transit Center was to protect the facility and the Marsac Mill site, which is known to contain elevated levels of heavy metals.
- Non-compliant lots were required to conform by December 31, 2004.
- Non-sampled and uncharacterized lots are to be sampled by 2006.
- Non-compliance has been upgraded to a nuisance and enforced as a Class B Misdemeanor.
- The lot-testing fee for compliance has been waived and is now done without a $100.00 charge to the owner. In addition, the City conducts sampling on generated soils destine for disposal and there is no charge for TCLP analysis.
- No parking of vehicles on capped lots.

4.0 ANNUAL LOT RISK ASSESSMENT

The risk assessment was completed this year resulting in two properties being issued Administrative Civil Enforcement (ACE) penalties for non-compliance with the ordinance. The ACE program is a new program that administers a daily fine ($25) for non-compliance with the ordinance.

The owner of 2273 Samuel Colt Drive was cited this year for not maintaining the clean top-soil cap and acceptable cover. As a result, a letter was sent to the owner on August 20th 2008 informing them of the non-compliance and exposure to civil penalty. The property was re-landscaped and capped, therefore confirmation samples were procured on September 15th 2008 and reflected compliant lead levels (65 ppm). Therefore the Certificate of Compliance was re-instated and the property is considered compliant with the ordinance.

4.1 Non-Characterized Lots

Within the original ordinance area all lots have been sampled, therefore there were no notices sent for non-characterized lots. The only exception to that statement is that there still remain non-characterized lots within the Expanded Soils Ordinance Boundary; however those properties will be addressed once the original ordinance boundary reaches 100% compliance.

5.0 NON-COMPLIANT LOTS

Within the original ordinance area non-compliant owners have been issued Final Notices or Administrative Civil Enforcement citations. The remaining lots are planned to be remediated in 2009 and attain compliance with the ordinance. The City anticipates 100% compliance during the year of 2009 for the original ordinance boundary.

6.0 EDUCATION AND OUTREACH

In order to assist with the EMS educational and outreach obligations, PCMC distributed two products titled "Park City Environmental Information Handbook" and "Soils Ordinance Home Owners BMP Brochure". The Environmental Information Handbook and Home Owners BMP Brochure contain the following information:

- Soils Ordinance FAQ's.
- Residential Best Management Practices
- Ordinance Boundary Compliance Map
- Top Soils Assistance Program (TSAP)
- Soils Ordinance Boundary Map
- Streets within Boundary
- Addresses within Boundary
- Gardening and Plant Bed Recommendations
- Storm Water Quality
- Conservation Reserve Program
- Open Space Information
- Recycling Program
- Household Waste Oil Acceptors
- Drinking Water Information
- Water Treatment Information
- Blue Sky Program
- Contacts and Reference (This section included the county contact for blood lead testing.)

This year the handbook was sent to the following entities as a reference:

- All owners of property within the original and expanded boundary.
- Real Estate Agents
- Land Management
- Local Pediatricians
- HOA's
- Homebuyers
- PCMC employees
- Contractors
- Building Permit recipients

The second outreach product distributed, was the Home Owners Best Management Practice Brochure. The BMP brochure was sent out to all residents within the Soils Ordinance Boundary on February 20th 2008. This product is also made available in the Building and Planning Department and was sent to the EMS other outreach contacts that were agreed to by the Soils Stakeholder Group. Regarding the Environmental Information Handbook, it will be revised and updated this year. Current plans are to print 1,500 handbooks that will be sent out to all owners within the Soils Ordinance District ($12,000.00).

6.1 Soil Ordinance Resident Notices

On January 7th 2008, residents that have an issued "Certificate of Compliance" were sent a lead awareness letter. The purpose of the letter is to increase property owner awareness of the underlying lead levels that are contained on a per lot basis. For those that received this correspondence, the City had historical data on the initial sampling that occurred for the lot before it was capped. This data was queried from the Environmental Database and all lots with

an underlying lead level that exceeded the USEPA Health Based Risk Standard (400 ppm lead) for residential property receive this correspondence. Also the Soils Ordinance Home Owners BMP brochure was sent to all ordinance addresses on February 20th 2008. The BMP brochure is also included in all newly issued "Certificate of Compliance" documents that are sent to the owners. Lastly, in addition to these outreach efforts, the brochure and handbook are made available at the Marsac Building and Park City Public Library.

6.2 Summit County Lead Screening Services

The Summit County Blood Lead Screening Service has been mentioned in both the Homeowner BMP Brochure and the Environmental Information Handbook under contacts and FAQs. The address and phone number for the county testing program is documented in these two outreach products for residents that wish to be tested. In addition, the City receives phone inquiries for testing children and they are referred to the Summit County Health Department.

6.3 New Residents and Renters Orientation

PCMC has supplied the Environmental Information Handbook and BMP brochure to land management and real estate agencies. Addendum 13 represents the letter that was sent along with the BMP brochures, which were sent to those companies on February 2nd 2007. The Building Department receives numerous calls from prospective buyers and real estate agents requesting the information handbooks and BMP brochures.

6.4 Real Estate Agent Orientation

Real Estate agencies were provided with the Environmental Information Handbook and BMP brochure for distribution and to make them aware of the ordinance standards. Nineteen agencies were sent this information on May 27th 2008. During all of the educational meetings the Park City Environmental Information Handbook and storm water brochures were distributed as an educational resource. In addition, on May 8th 2008, Jeff Schoenbacher spoke at the Yarrow Inn during the Annual Park City Board of Realtors Environmental Meeting and provided an update on the soils ordinance compliance. This meeting is held annually and is intended to keep the realtors up to date on the City's environmental programs and institutional controls. Park City Board of Realtors representatives are also trained on the use of the Environmental WebGIS Module, which is located at the following URL - http://www.mapserv.utah.gov/ParkCityGIS/. To date this has been an instrumental tool in educating stakeholders regarding the environmental issues and it receives an average of 200 service requests per day.

6.5 Lead Awareness Campaign to Local Physicians

On May 27th 2008, five clinics were sent an awareness correspondence along with numerous BMP brochures for distribution. The correspondence also contained the Environmental Information Handbook that identifies the addresses that reside within the ordinance boundary. Within the letter PCMC encourages physicians to test for blood lead for those clients residing within the boundary.

6.6 Deployment of the Environmental WebGIS Module http://www.mapserv.utah.gov/ParkCityGIS/

On October 3rd 2007, PCMC released the first WebGIS application which is used as a resource

to identify the environmental impacts within historical mining district. The purpose of this application is to convey the City's environmental impacts to the public via the Web.

The following is the data you will find at this site:

- **Environmental Management System Annual Reports**
  Reports that are sent to regulatory agency that provides an update on current remediation.
- **Storm water Management Plan Annual Reports**
  Reports that are sent to the regulatory agencies defining the city's storm water efforts to improve water quality in the watersheds.
- **Working Soils Ordinance Regulations**
  The actual ordinance approved by USEPA and UDEQ.
- **Soils Ordinance Boundary Search**
  The boundary that defines all regulated properties within the ordinance boundary and the search conveys whether it is within the boundary.
- **Soils Ordinance Capping Compliance**
  Information provides you with compliance status and associated lead concentrations for sampled lots. Red represents compliance, black non-compliant, yellow compliant during the improvement district.
- **Known Mine Tailings Area**
  Areas known to be impacted with mine tailings.
- **Mine Hazards**
  Known mine hazards in the area.
- **FEMA Flood Zone Delegations**
  Regulated flood zone areas within the city limits.
- **City Zoning**
  Different zoning areas with the city limits.
- **Regulated Streams**
  Navigable waters within the city limits.
- **Jurisdictional Wetlands**
  Wetlands protected within the city limits with a 50' defined buffer.
- **Watershed Boundaries**
  These layers represent East Canyon and Silver Creek Watershed.
- **Drinking Water Source Protection Zones**
  Drinking water recharges source protection zones protected under ordinance.
- **10' Elevation Contours**
- **Bike Trails**
- **Conservation Reserve Program**
  Layer represents the permanent riparian buffer zone for McLeod Creek Stream corridor.

7.0 PROSPECTOR SAMPLING RECORDS AND DATA

PCMC continues to populate a comprehensive database to track lot compliance and analytical results. The database has been populated with analytical results dating back to 1985. This data includes initial sampling projects as well as verification sampling results that are conducted after the cap is installed. The system is connected to a GIS ArcMap project that plots all capped lots and spatial evaluations can be conducted in regards to lead levels. Lastly, the GIS ArcMap continues to expand upon the discovery of new historic mining impacts.

8.0 PROSPECTOR DRAIN OUTFALL

This year PCMC with oversight from Dr. Fitch from the University of Missouri Rolla Civil Environmental Engineering Department and David Reisman who is the Director of USEPA's ORD Engineering Technical Support Center and National Risk Management Research Laboratory built the full-scale biocell for treating the Prospector Drain. As stated in previous annual reports, this system is intended to treat the Prospector Drain outfall, thereby reducing the zinc and cadmium load to the Silver Creek Watershed. Picture 19 represents the unit during construction on October 7th 2008.

Picture 2: Biocell pictured to the west.

Last year the vault upstream from the full-scale wetland was constructed and will act as a bypass, in the event the flow exceeds the treatment capacity. This unit also has flow meter installed in order to monitor the flow entering the biocell as well as the flow bypassing the treatment unit.

The biocell project has been a four effort with three of those years operating a pilot project to research if this unit would work. Attachment 19 contains the results for the pilot cell to June 5th 2007 and Attachment 20 contains a summary of the sampling results for the Prospector Drain. Furthermore, Dr. Fitch has written a complete analytical summary of the results from the pilot and it is represented as Attachment 21. Park City employed several experts that need to be recognized for the final design. Dr. Fitch designed the unit, Al Mattes and Bill Duncan from Nature Works Remediation as well and David Reisman with USEPA provided technical oversight. Counterpoint Construction was awarded the bid to construct the unit that was completed on October 18th 2008.

Currently, the redox potential (ORP) in the influent is about 240 mV, and the in-situ sample points are 40 mV. Therefore, the influent is aerobic (~4 mg/L D.O.) and the biocell is fully anaerobic. Although values are not precise, the following reference chart depicts ORP and expected metabolism.

- http://www.frwa.net/TRAINING/WASTEWATER/methods_of_controlling_nitrogen%20C.htm

As a reference point, the oxidizing potential for disinfection is in the +600 to +700 mV range. The field measurements for the wetland in situ value are below -200 mV, which is indicative of sulfate reduction.

On December 3rd 2008 and the results are favorable and compliant with TMDL end point goals.

- **TMDL Limits**

Cadmium	.00076 mg/l
Zinc	.39 mg/l

- **Inflow**

Cadmium (Dissolved)	.053 mg/l
Zinc (Dissolved)	6.83 mg/l

- **Outflow - Endpoint**

Cadmium (Dissolved)	**N/D mg/l - Non Detect**
Zinc (Dissolved)	**.19 mg/l**

9.0 WORKER HEALTH AND SAFETY

All external and internal utility or contract workers involved in generating soils and earthwork have been provided with a Worker Health and Safety Notice and recommended protective equipment. It is PCMC intent to increase worker awareness of practices that they can employ to minimize exposure to them and their families. This year the Alice Lode project and Park City High School reconstruction project commenced after the contractor submitted a Soils Management Protocol, Storm Water Management Plan, and Work Health and Safety. Also the contractor was required to provide employees with the Worker Health and Safety Notice and make them aware of the necessary personal protection required for the project.

Other companies that were required to fulfill the above worker health and safety requirements and soil management protocol were Oakland, Park City Municipal Corporation, and Counter Point Construction. The City requires larger projects submit a more extensive soils management plan that specifies the worker health and safety requirements (PPE), disposal companies, and best management practices as it relates to storm water controls.

10.0 TOP SOIL ASSISTANCE PROGRAM (TSAP)

Consistent with Council policy direction and to encourage accelerated compliance with the Soils Ordinance, to date $32,246.00 has been allotted to property owners for installing acceptable cover. This program provides property owners with assistance and incentive to procure compliant topsoil to adequately cap properties with known elevated lead levels. The TSAP has been divided into two funding phases; Phase I is specific to lots within the Original Ordinance Boundary (Prospector) and a Phase II is for the properties within the entire Soils Ordinance Boundary (Original and Expanded). The program was approved and funded by the City Council on August 11th 2004 and is administered by the Building Department. Upon issuance of a Certificate of Compliance the owner is provided with a TSAP summary fact sheet and instructions for reimbursement.

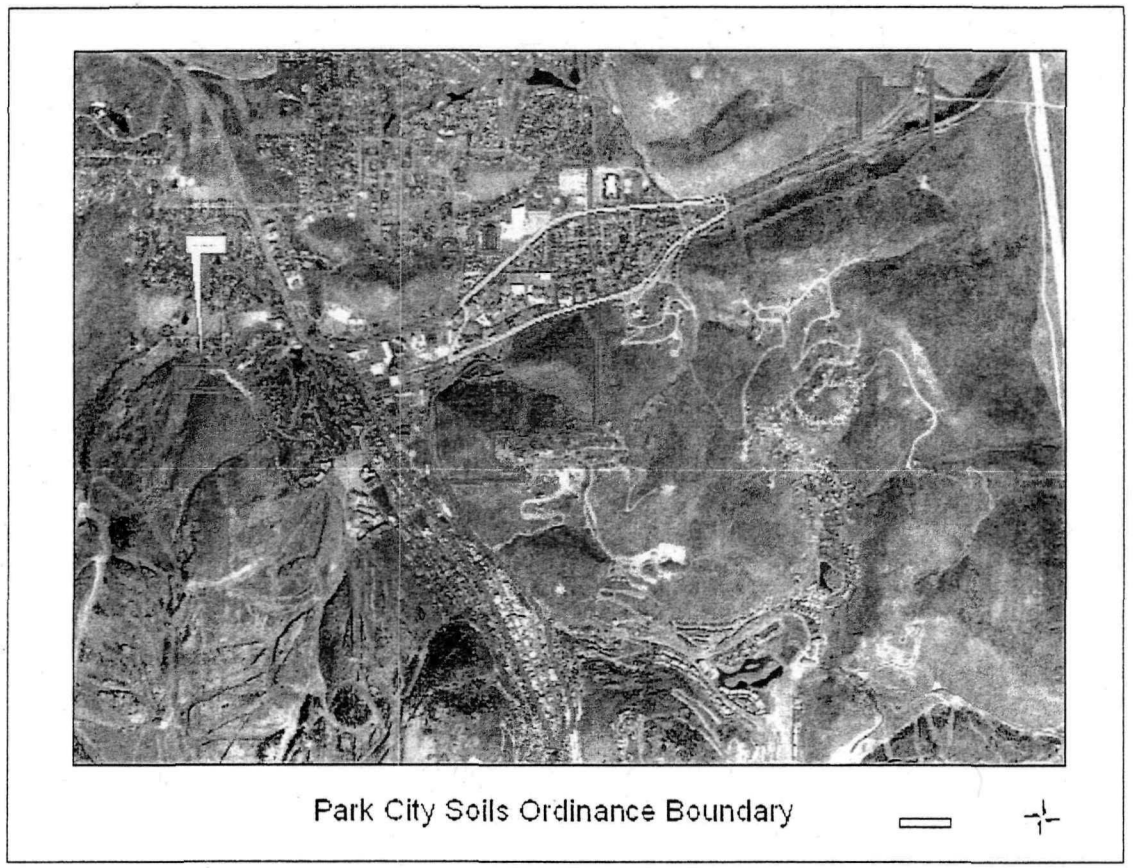
TAB #5

CHAPTER 15 - PARK CITY LANDSCAPING AND MAINTENANCE OF SOIL COVER

11-15- 1. AREA.

This Chapter shall be in full force and effect only in that area of Park City, Utah, which is depicted in the map below and accompanied legal description, hereinafter referred to as the Soils Ordinance Boundary.

(Amended by Ord. No. 03-50)



MAP OF AREA SUBJECT TO LANDSCAPING AND TOPSOIL REQUIREMENTS (ORIGINAL MAP AMENDED BY THIS ORDINANCE ON FILE IN THE CITY RECORDER'S OFFICE) and as described as follows:

Beginning at the West 1/4 Corner of Section 10, Township 2 South, Range 4 East, Salt Lake Base & Meridian; running thence east along the center section line to the center of Section 10, T2S, R4E; thence north along the center section line to a point on the easterly Park City limit line, said point being South 00°04'16" West 564.84 feet from the north 1/4 corner of Section 10, T2S, R4E; thence along the easterly Park City limit line for the

following thirteen (13) courses: North 60°11'00" East 508.36'; thence North 62°56' East 1500.00'; thence North 41°00' West 30.60 feet; thence North 75°55' East 1431.27'; thence North 78°12'40" East 44.69 feet; thence North 53°45'47" East 917.79 feet; thence South 89°18'31" East 47.22 feet; thence North 00°01'06" East 1324.11 feet; thence North 89°49'09" West 195.80 feet; thence South 22°00'47" West 432.52'; thence South 89°40'28" West 829.07 feet; thence North 00°09'00" West 199.12 feet; thence West 154.34 feet to a point on the west line of Section 2, T2S, R4E; thence south on the section line to the southerly right-of-way line of State Route 248; thence westerly along said southerly right-of-way line to the easterly right-of-way line of State Route 224, also known as Park Avenue; thence southerly along the easterly line of Park Avenue to the west line of Main Street; thence southerly along the westerly line of Main Street to the northerly line of Hillside Avenue; thence easterly along the northerly line of Hillside Avenue to the westerly line of Marsac Avenue, also known as State Route 224; thence northerly along the westerly line of Marsac Avenue to the westerly line of Deer Valley Drive; thence northerly along the westerly line of Deer Valley Drive, also known as State Route 224, to the southerly line of Section 9, T2S, R4E; thence easterly to the west line of Section 10, T2S, R4E; thence northerly to the point of beginning.

Together with the following additional parcels:

Spiro Annexation Area Legal Description:

A parcel of land located in Summit County, Utah, situated in the southeast quarter of Section 8, Township 2 South, Range 4 East, Salt Lake Base and Meridian, being more particularly described as follows:

Beginning at a point that is South 396.80 feet and West 1705.14 feet from the East quarter corner of Section 8, Township 2 South, Range 4 East, Salt Lake Base and Meridian, said point being a 5/8" rebar on the westerly right-of-way line of Three Kings Drive, as described on the Arsenic Hall Annexation Plat, recorded no. 345954 in the office of the Summit County Recorder, said point also being on a curve to the left having a radius of 625.00 feet of which the radius point bears North 71°08'49" East; and running thence southeasterly along said right-of-way line the following three (3) courses: (1) southeasterly along the arc of said curve 352.91 feet through a central angle of 32°21'09"; thence (2) South 51°12'20" east 141.13 feet to a point on a curve to the right having a radius of 290.00 feet, of which the radius point bears South 38°47'40" West; thence (3) along the arc of said curve 70.86 feet through a central angle of 14°00'00"; thence along the southwesterly right-of-way line of Three Kings Drive and along the arc of a 680.00 foot radius curve to the left, of which the chord bears South 47°16'17" East 235.91 feet; thence along the westerly boundary of the Dedication Plat of Three Kings Drive and Crescent Road, recorded no.116010 in the office of the Summit County Recorder, the following eight (8) courses: (1) South 57°12'20" east 39.07 feet to a point on a curve to the right having a radius of 495.00 feet, of which the radius point bears South 32°47'40" West; thence (2) along the arc of said curve 324.24 feet through a central angle of 37°31'50"; thence(3) South 19°40'30" East 385.45 feet to a point on a curve to the left having a radius of 439.15 feet, of which the radius point bears North

70°19'30" East; thence (4) along the arc of said curve 112.97 feet through a central angle of 14°44'21" to a point of reverse curve to the right having a radius of 15.00 feet, of which the radius point bears South 55°35'09" West; thence (5) southerly along the arc of said curve 22.24 feet through a central angle of 84° 57'02" to a point of compound curve to the right having a radius of 54.94 feet, of which the radius point bears North 39°27'49" West; thence (6) westerly along the arc of said curve 115.99 feet through a central angle of 120°57'49"; thence (7) North 08°30'00" West 31.49 feet to a point on a curve to the left having a radius of 105.00 feet, of which the radius point bears South 81°30'00" West; thence (8) along the arc of said curve 378.43 feet through a central angle of 206°30'00" to a point on the easterly line of Park Properties, Inc. parcel, Entry no. 129128, Book M73, page 31, in the office of the Summit County Recorder; thence along the easterly boundary of said parcel the following five (5) courses: (1) North 42°30'00" West 220.00 feet; thence (2) North 11°00'00" West 235.00 feet; thence (3) North 21°32'29" West 149.57 feet (deed North 21°30'00" West 150.00 feet) to a 5/8" rebar; thence (4) North 42 30'49" West 195.18 feet (deed North 42°30'00" West 195.29 feet) to a 5/8" rebar; thence (5) North 89°57'46" West 225.95 feet (deed West 224.19 feet) to a 5/8" rebar; thence along a boundary of Park Properties, Inc. parcel, Entry no. 324886, Book 565, Page 717, in the office of the Summit County Recorder the following three (3) courses: (1) North 02°45'19" East 99.92 feet (deed North 100.20 feet) to a 5/8" rebar; thence (2) North 89°51'20" West 496.04 feet to a 5/8" rebar; thence (3) North 89°35'52" West 481.94 feet (deed North89 45'00" West 992.17 feet for courses (2) and (3) to a point on the west line of the southeast quarter of Section 8, Township 2 South, Range 4 East, Salt Lake Basin and Meridian; thence along said quarter section line North 00°15'24" West 407.62 feet to a point on the Bernolfo Family Limited Partnership parcel, Entry no. 470116, Book 1017, Page 262, in the office of the Summit County Recorder, thence North 89°59'54" East 482.91 feet (deed East 493.92 feet) to a point on the Vince D. Donile parcel, Entry no. 423999, Book 865, Page 287, in the office of the Summit County Recorder, said point being a 5/8" rebar and cap; thence along said parcel the following five (5) courses: (1) South 89°59'49" East 358.30 feet (deed East 358.35 feet) to a point on a non tangent curve to the right having a radius of 110.00 feet, of which the radius point bears South 88°41'47" East (deed South 88°44'18" East); thence (2) northerly along the arc of said curve 24.32 feet (deed 24.14 feet) through a central angle of 12°39'58" to a 5/8" rebar cap; thence (3) North 13°46'17" East 49.98 feet (deed North 13°50'00" East 50.00 feet) to a 5/8" rebar and cap on a curve to the right having a radius of 60.00 feet (chord bears North 27 16'47" East 28.00 feet); thence (4) northeasterly along the arc of said curve 28.26 feet (deed 28.27 feet) through a central angle of 26°59'09" to a 5/8" rebar and cap; thence (5) North 40°46'38" East 83.23 feet (deed North 40°50'00" East 83.24 feet) to the point of beginning.

The basis for bearing for the above description is South 00°16'20" West 2627.35 feet between the Northeast corner of Section 8, and the East quarter corner of Section 8, Township 2 South, Range 4 East, Salt Lake Base & Meridian. TAX SERIAL NOS. PP-25-A AND PCA-1002-C-1

To be combined with a parcel of land located in Summit County, Utah, situated in the southeast quarter of Section 8, Township 2 South, Range 4 East, Salt Lake Base and Meridian, being more particularly described as follows:

Beginning at a point that is West 1727.82 feet and South 310.72 feet from the East quarter corner of Section 8, Township 2 South, Range 4 East, Salt Lake Base and Meridian, said point being on the westerly right-of-way of Three Kings Drive and running thence West 417.99 feet; thence South 246.59 feet; thence East 358.35 feet to a point on a curve to the right, the radius point of which bears South 88°44'18" east 110.00 feet; thence northeasterly along the arc of said curve 24.14 feet to the point of tangency; thence North 13°50'00" East 50.00 feet to the point of a 60.00 foot radius curve to the right; thence northeasterly along the arc of said curve 28.27 feet to the point of tangency; thence North 40°50'00" East 83.24 feet to a point on the westerly right-of-way of Three Kings Drive, said point being on a curve to the right, the radius point of which bears North 71°07'38" East 625 feet; thence northwesterly along the arc of said curve and along the right-of-way 89.33 feet to the point of beginning. TAX SERIAL NOS. PCA-1002-F

Also including the Park City High School and Elementary School properties identified as Tax Serial Numbers (PCA-2-2300-X, PCA-2-2300-A-1-X, PCA-2-2101-6-A-X, PCA-2-2101-6-X).

EXCEPTING THEREFROM all lots and parcels platted as Chatham Crossing Subdivision, Hearthstone Subdivision, Aerie Subdivision and Aerie Subdivision Phase 2, according to the official plats thereof recorded in the office of the Summit County Recorder.

(Amended by Ord. No. 03-50)

11-15- 2. MINIMUM COVERAGE WITH TOPSOIL OR OTHER ACCEPTABLE MEDIA.

(A) All real property within the Soils Ordinance Boundary must be covered and maintained with a minimum cover of six inches (6") of approved topsoil and acceptable cover described in Section 11-15-3 over soils exceeding the lead levels specified in Section 11-15-7, except where such real property is covered by asphalt, concrete, permanent structures or paving materials.

(B) As used in this Chapter, "approved topsoil" is soil that does not exceed 200 mg/Kg (total) lead representatively sampled and analyzed under method SW-846 6010.

(C) Parking of vehicles or recreational equipment shall be contained on impervious surfaces and not areas that have been capped with acceptable media.

(Amended by Ord. No. 03-50)

11-15- 3. ACEPTABLE COVER.

(A) All areas within the Soils Ordinance Boundary where real property is covered with six inches (6") or more of "approved topsoil" defined in Section 11-15-2 (B) must be vegetated with grass or other suitable vegetation to prevent erosion of the 6" topsoil layer as determined by the Building Department.

(B) Owners that practice xeriscape are allowed to employ a weed barrier fabric if the property is covered with six inches (6") of rock or bark and maintained to prevent soil break through.

(C) As used in this Chapter, "soil break through" is defined as soil migrating through the fabric and cover in a manner that exposes the public and shall be deemed in violation of this Chapter.

(D) As used in this Chapter, "xeriscape" is defined as a landscaping practice that uses plants that grow successfully in arid climates and a landscaping design intended to conserve City water resources.

(Amended by Ord. No. 03-50)

11-15- 4. ADDITIONAL LANDSCAPING REQUIREMENTS.

In addition to the minimum coverage of topsoil requirements set forth in Section 11-15-2 and the vegetation requirements set forth in Section 11-15-3, the following additional requirements shall apply:

(A) **FLOWER OR VEGETABLE PLANTING BED AT GRADE**. All flower or vegetable planting beds at grade shall be clearly defined with edging material to prevent edge drift and shall have a minimum depth of twenty-four inches (24") of approved topsoil so that tailings are not mixed with the soil through normal tilling procedures. Such topsoil shall extend twelve inches (12") beyond the edge of the flower or vegetable planting bed.

(B) **FLOWER OR VEGETABLE PLANTING BED ABOVE GRADE**. All flower or vegetable planting beds above grade shall extend a minimum of sixteen inches (16") above the grade of the six inches (6") of approved topsoil cover and shall contain only approved topsoil.

(C) **SHRUBS AND TREES**. All shrubs planted after the passage of this Chapter shall be surrounded by approved topsoil for an area, which is three times bigger than the rootball and extends six inches (6") below the lowest root of the shrub at planting. All trees planted after the passage of this Chapter shall have a minimum of eighteen inches (18") of approved topsoil around the rootball with a minimum of twelve inches (12") of approved topsoil below the lowest root of the tree.

(Amended by Ord. No. 03-50)

11-15- 5. DISPOSAL OR REMOVAL OF AREA SOIL.

(A) Following any work causing the disturbance of soils within the Soils Ordinance Boundary, such as digging, landscaping, and tilling soils, all disturbed soils must be collected and reintroduced onsite by either onsite soil capping specified in Section 11-15-2 or off-site disposal as required by this Chapter and/or State and/or Federal law.

(B) All soil generated from the Soils Ordinance Boundary that cannot be reintroduced within the Soils Ordinance Boundary and are destined for off-site disposal must be sampled and characterized with representative sampling and tested at a State Certified Laboratory.

(C) Soils exhibiting a hazardous characteristic exceeding the following Toxic Characteristic Leaching Procedure (TCLP) standards, must be managed as a hazardous waste and disposed of within a Utah Department of Environmental Quality permitted facility:

Arsenic – 5.0 mg/L (TCLP) Method 6010 B

Lead – 5.0 mg/L (TCLP) Method 6010 B

(D) Soils not failing the TCLP standards may be disposed within a non-hazardous landfill facility providing a "Disposal Acceptance Letter" to the Building Department is issued by the disposal facility.

(E) No soils generated within the Soils Ordinance Boundary are allowed to be exported for use as fill outside the Soils Ordinance Boundary.

(F) Reuse of generated soils within the Soils Ordinance Boundary is acceptable provided the receiving property is covered with six inches (6") of clean topsoil or covered with an acceptable media, i.e. vegetation, bark, rock, as required by this Chapter.

(G) Soils that are relocated within the Soils Ordinance Boundary must be pre-approved by the Building Department before being relocated and reused.

(Amended by Ord. No. 03-50)

11-15- 6. DUST CONTROL.

Contractor or owner is responsible for controlling dust during the time between beginning of construction activity and the establishment of plant growth sufficient to control the emissions of dust from any site. Due care shall be taken by the contractor or owner, to protect workmen while working within the site from any exposure to dust emissions during construction activity by providing suitable breathing apparatus or other appropriate control.

11-15- 7. CERTIFICATE OF COMPLIANCE.

(A) Upon application by the owner of record or agent to the Park City Building Department and payment of the fee established by the department, the Park City Building Department shall inspect the applicant's property for compliance with this Chapter. When the property inspected complies with this Chapter, a Certificate of Compliance shall be issued to the owner by the Park City Building Department.

(B) Verifying soil cap depth and representative samples results that are equal to or below the following standards will result in full compliance and eligibility for the certificate:

Occupied Property – Lead 200 mg/Kg (Total) Method SW-846 6010

Vacant Property – Lead 1000 mg/Kg (Total) Method SW-846 6010

(Amended by Ord. No. 03-50)

11-15- 8. TRANSIT CENTER DISTURBANCE

All construction activity, utility modification, and landscaping that results in the breach of the installed protective cap or the generation of soils must be conducted in accordance to the implemented Site Management Plan, which is retained within the Building Department.

(Amended by Ord. No. 02-32; 03-50)

11-15- 9. PROPERTY WITH KNOWN NON-COMPLIANT LEVELS OF LEAD

(A) Property exceeding the lead levels defined in Section 11-15-7 that have been representatively sampled and have not been capped per Section 11-15-2 are required to comply with this Chapter by December 31, 2004.

(B) Non-compliant lots exceeding the criteria within Section 11-15-7 will be sent two (2) warning notices in an effort to correct the non-compliance issue.

(Amended by Ord. No. 03-50)

11-15- 10. WELLS.

All wells for culinary irrigation or stock watering use are prohibited in the Area (Soils Ordinance Boundary).

11-15- 11. NON-SAMPLED AND UNCHARACTERIZED LOTS.

(A) Lots that have not been characterized through representative sampling and are

within the original Soils Ordinance Boundary are required to be sampled by the year 2006.

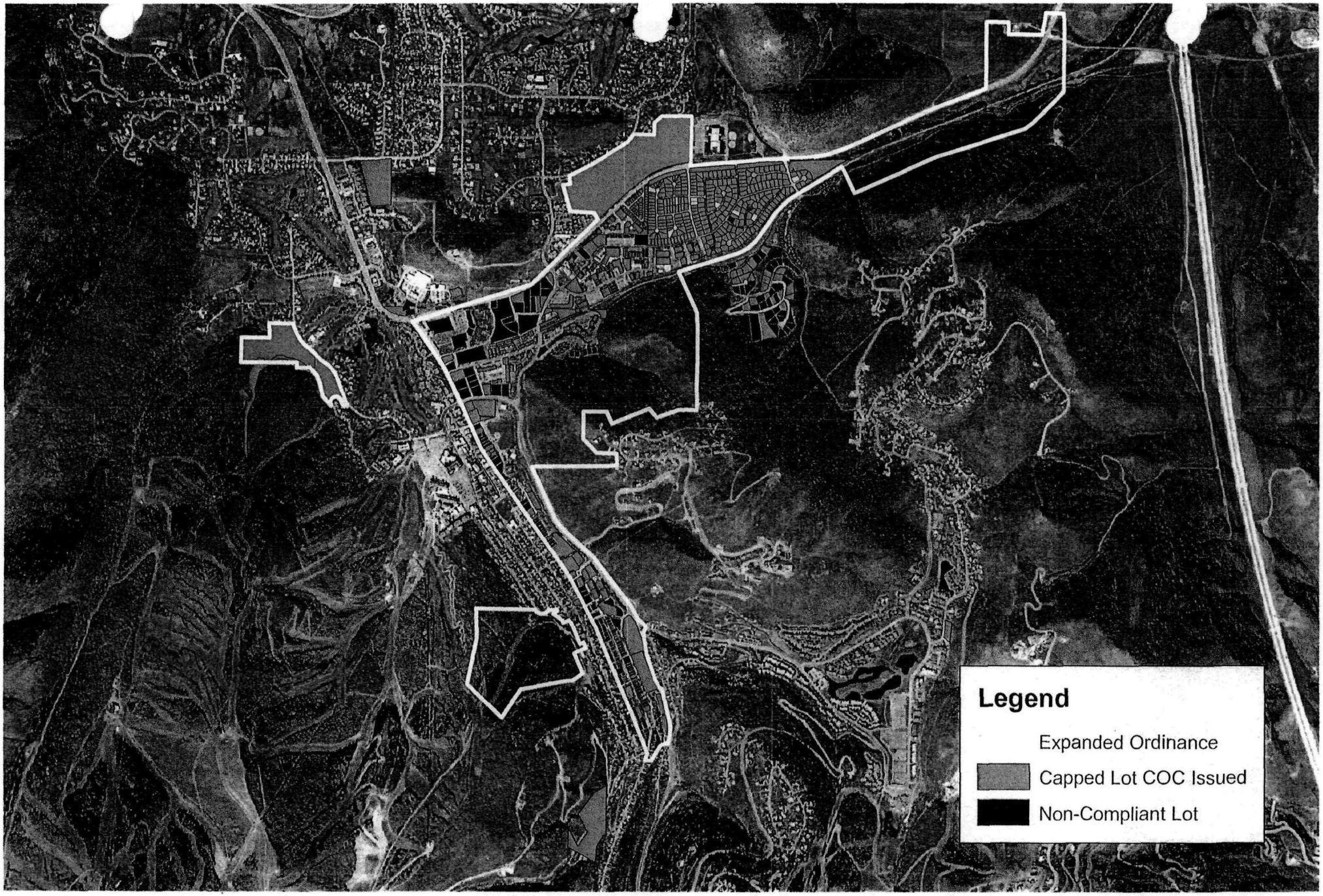
(B) After the property has been sampled, lots exceeding the lead levels within Section 11-15-7 are required to comply with this Chapter within a 12-month period.

11-15- 12. FAILURE TO COMPLY WITH CHAPTER.

Any person failing to landscape, maintain landscaping, control dust or dispose of tailings as required by this Chapter and/or comply with the provisions of this Chapter, shall be guilty of a Class B misdemeanor. Any person failing to comply with the provisions of this Chapter may be found to have caused a public nuisance as determined by the City Council of Park City, and appropriate legal action may be taken against that person.

(Amended by Ord. No. 03-50)

TAB #6



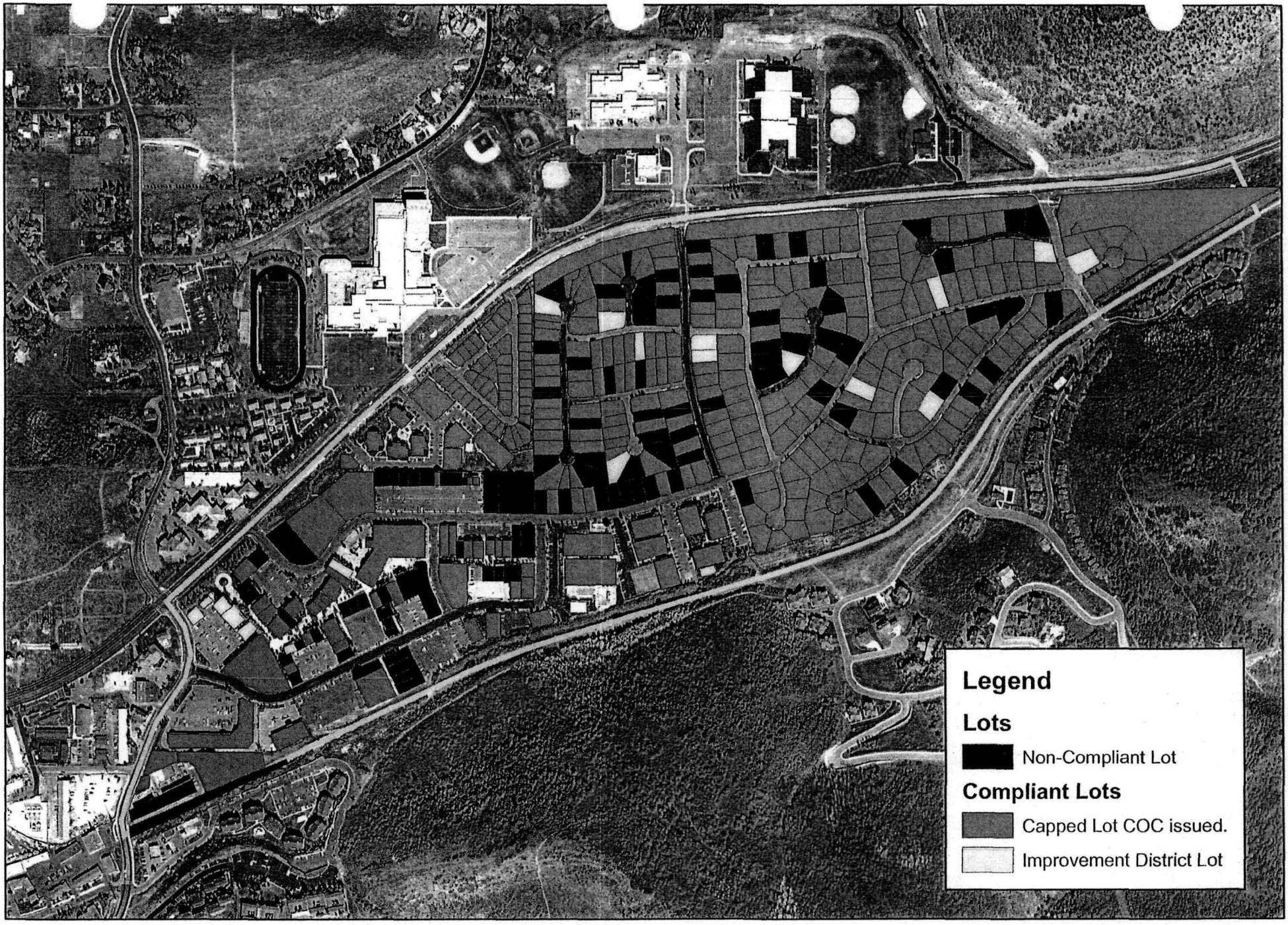
This drawing is neither a legally recorded map or a survey and is not intended to be used as such. The information displayed is a compilation of records, information and data obtained from various sources including the Park City Municipal Corporation which is not responsible for its accuracy or timeliness. Park City Municipal Corporation advises that anyone requiring survey quality positions, such as but not limited to, construction or boundary work, should consult with a competent licensed surveyor.

Park City Ordinance Area Over 700 Properties Capped

1,000 Feet

N
W E
S

TAB #7

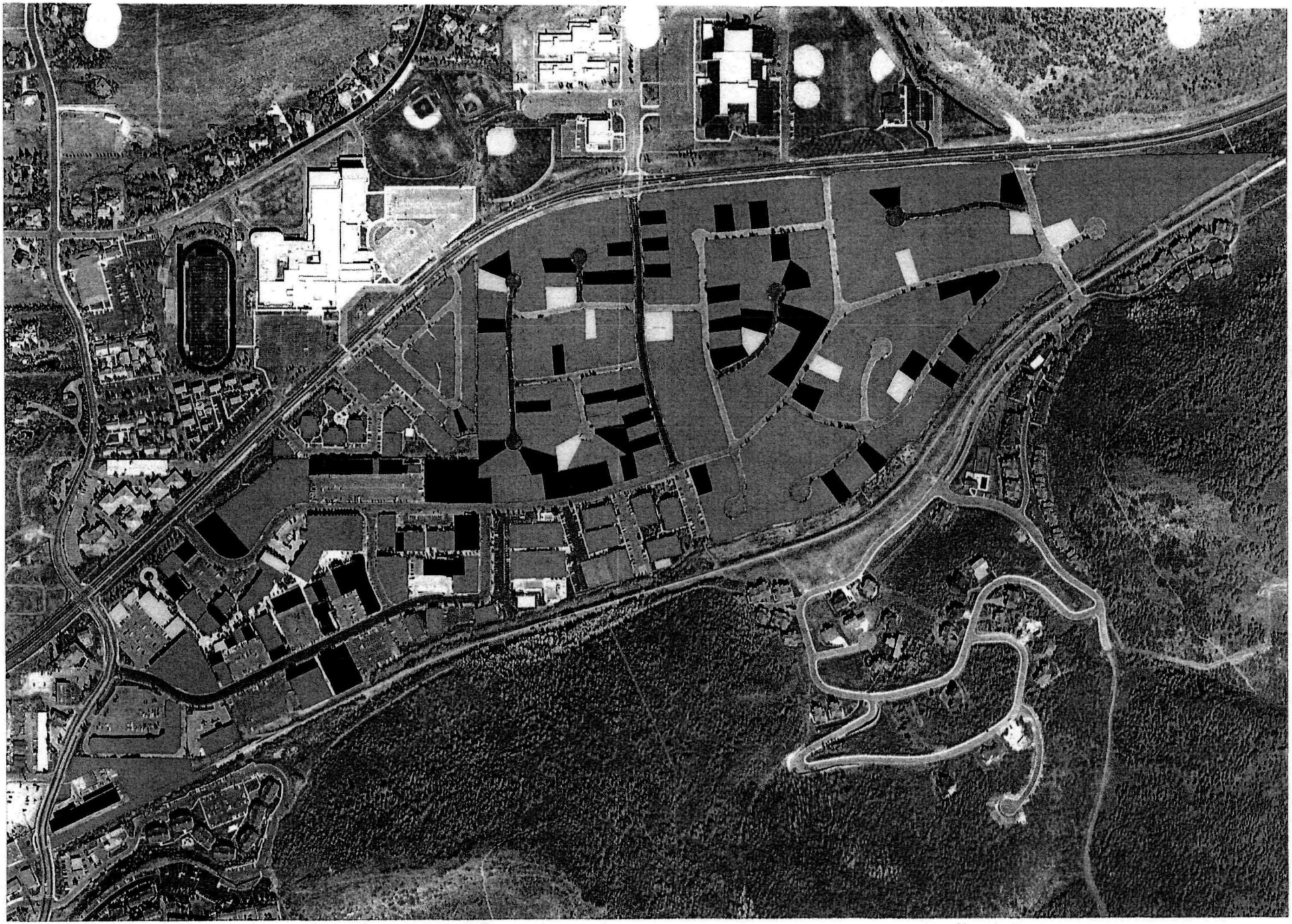


This drawing is neither a legally recorded map or a survey and is not intended to be used as such. The information displayed is a compilation of records, information and data obtained from various sources including the Park City Municipal Corporation which is not responsible for its accuracy or timeliness. Park City Municipal Corporation advises that anyone requiring survey quality positions, such as for, but not limited to, construction or boundary work, should consult with a competent licensed surveyor

2004

530 Feet

N
W E
S

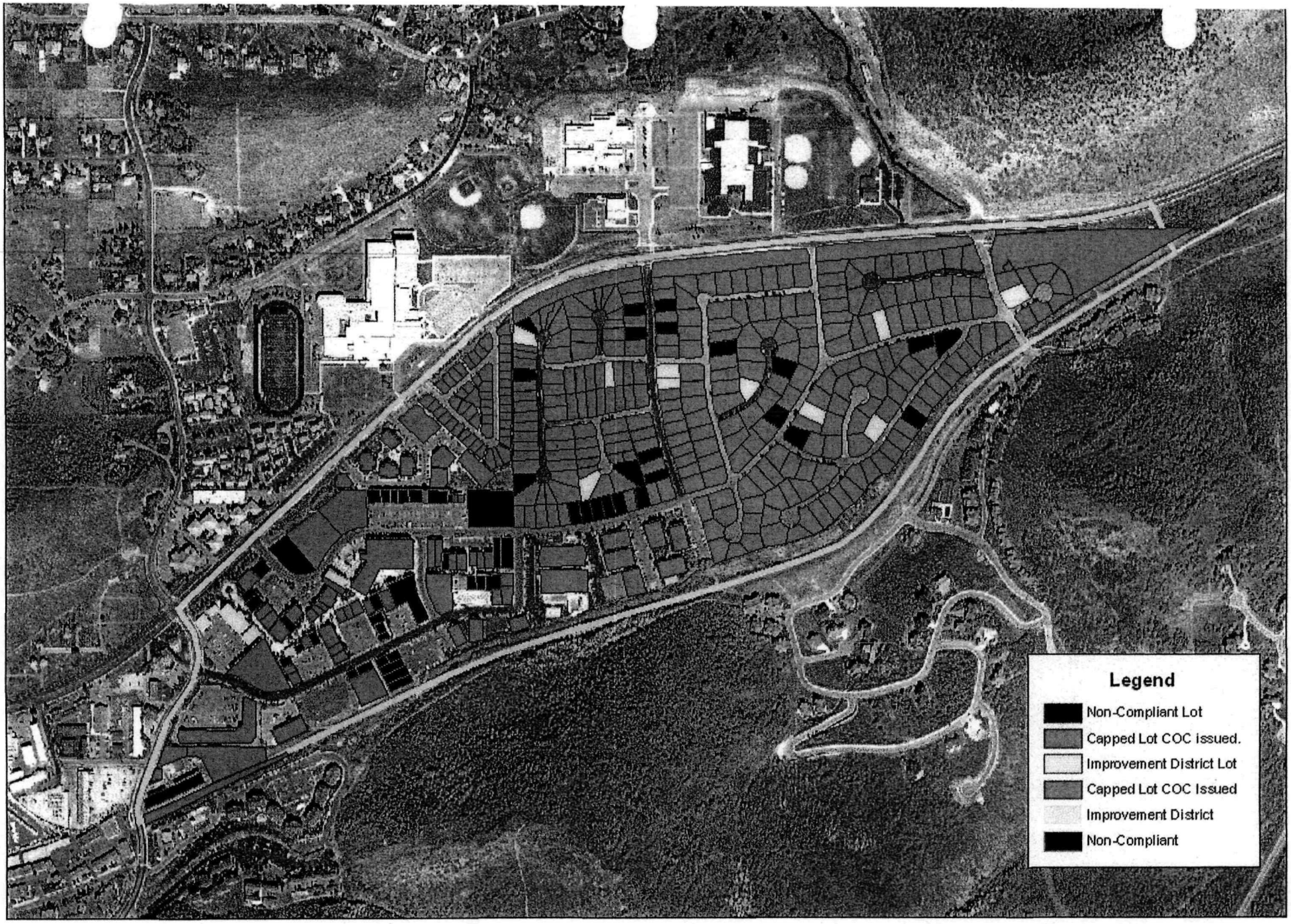


This drawing is neither a legally recorded map or a survey and is not intended to be used as such. The information displayed is a compilation of records, information and data obtained from various sources, including the Park City Municipal Corporation which is not responsible for its accuracy or timeliness. Park City Municipal Corporation advises that anyone requiring survey quality positions, such as for, but not limited to, construction or boundary work, should consult with a competent licensed surveyor.

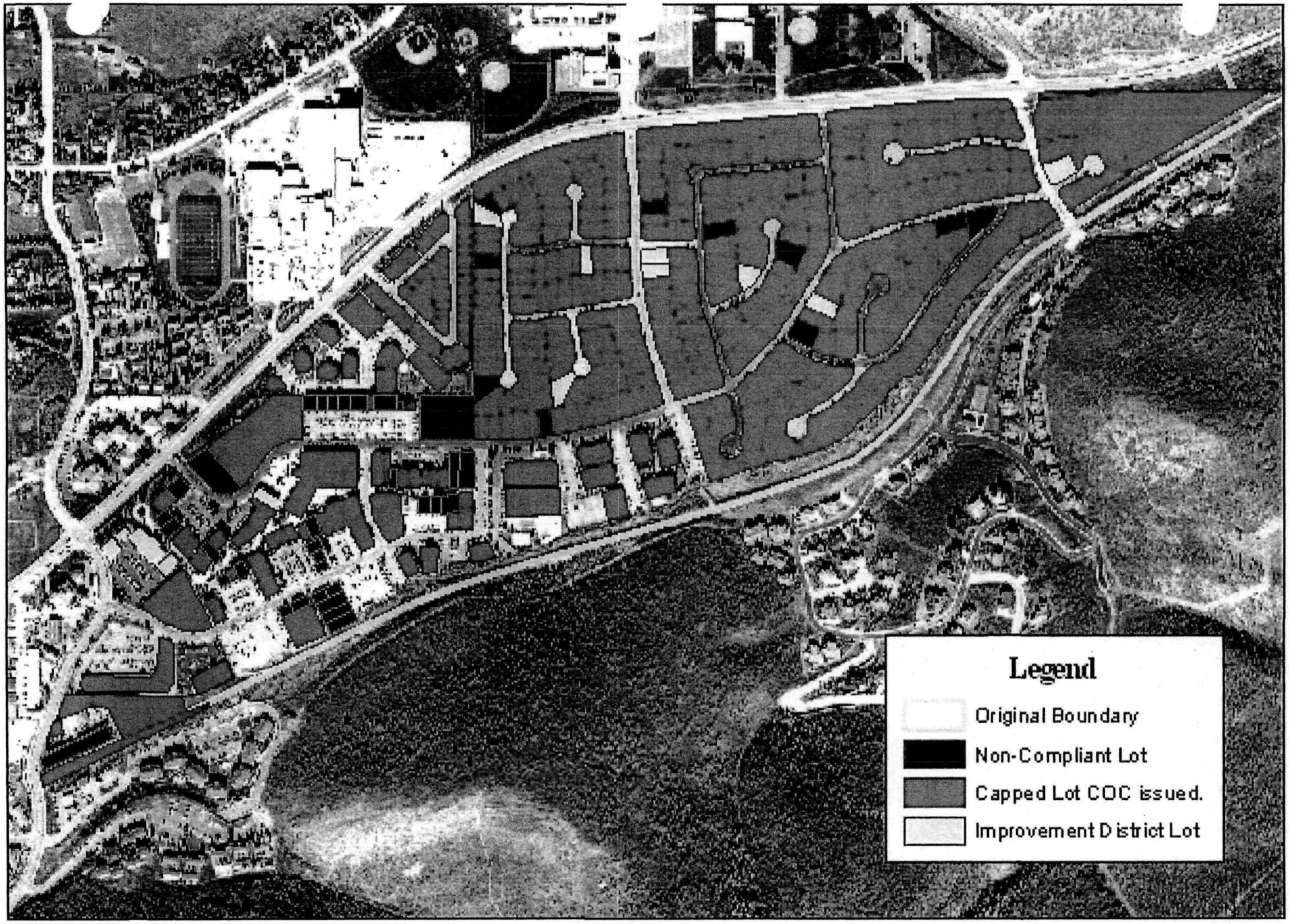
2005

1,000 Feet

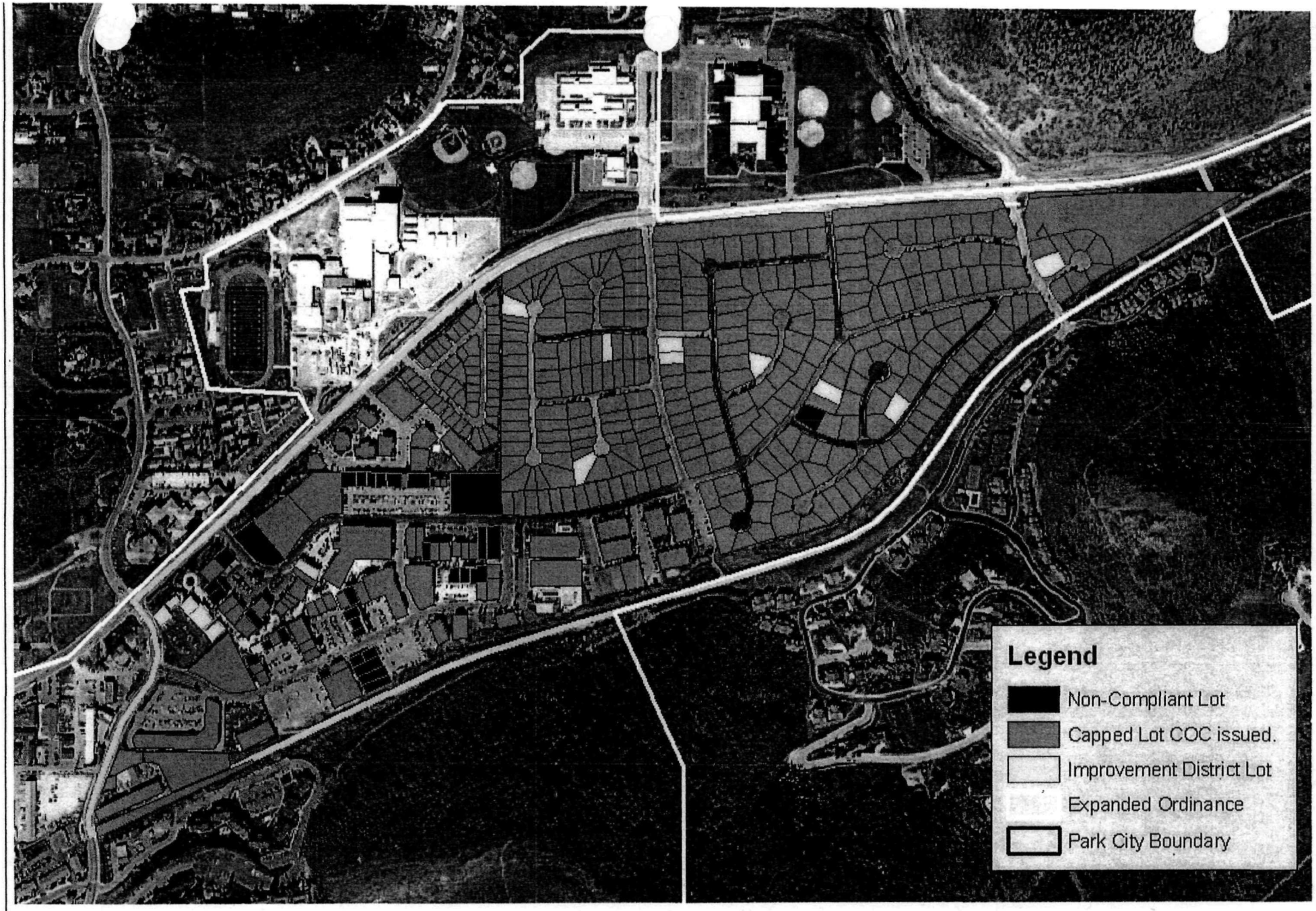
N


Legend
Non-Compliant Lot
Capped Lot COC issued.
Improvement District Lot
Capped Lot COC Issued
Improvement District
Non-Compliant

2006



Original Ordinance Area Compliance 10/07



2008 Soils Ordinance Compliance

500
Feet

TAB #8

Topsoil Assistance Program (TSAP)

Based on City records, upon issuance of a Certificate of Compliance your property is eligible for the topsoil reimbursement program under the TSAP program. The TSAP program offers reimbursement for the following properties:

Type A: Lots that are under enforcement and are required to be capped by the end of 2004 (24). Max reimbursement $450.00.

Type B: Lots that have not been sampled and are required to be sampled and characterized by 2006 if elevated levels of lead are detected (65). Max reimbursement $450.00.

Type C: Owners that volunteer to have their property sampled (~40) for the data collection of the Environmental Management System (EMS). Max reimbursement $150.00.

To be reimbursed please submit the following information:

- **Summary sheet that provides an overview of all costs associated with topsoil or acceptable cover (rock or bark).**
- **Receipts that document proof of purchase and costs.**
- **A completed W9 form which is a requirement for the Accounting and Budget Department.**
- **Address of where the reimbursement check should be sent.**

Once this information is received they will be sent in for reimbursement and a check will be sent to the address that you provided. The above information should be sent to the following address:

Park City Municipal Corporation
C/O Jeff Schoenbacher
445 Marsac Avenue
Park City, UT 84060

Should you have any questions feel free to contact me at 435 615 5058 or jschoenbacher@parkcity.org.

TAB #9

Pipe Schedule

4" Collector Pipe

Pipe #	Length	Pipe #	Length
2	6 ft	36	45.6 ft
4	9.25 ft	38	48.25 ft
6	11 ft	40	53.1 ft
8	12.3 ft	42	57.4 ft
10	14.75 ft	44	62.35 ft
12	16.75 ft	46	67.1 ft
14	19.25 ft	48	69 ft
16	21.5 ft	50	72.75 ft
18	23.5 ft	52	74 ft
20	24 ft	54	78.2 ft
22	25 ft	56	83.6 ft
24	26 ft	58	87.3 ft
26	28 ft	60	88.4 ft
28	30.75 ft	62	88.4 ft
30	33.3 ft	64	43 ft
32	37.3 ft	66	45 ft
34	42 ft	68	48 ft

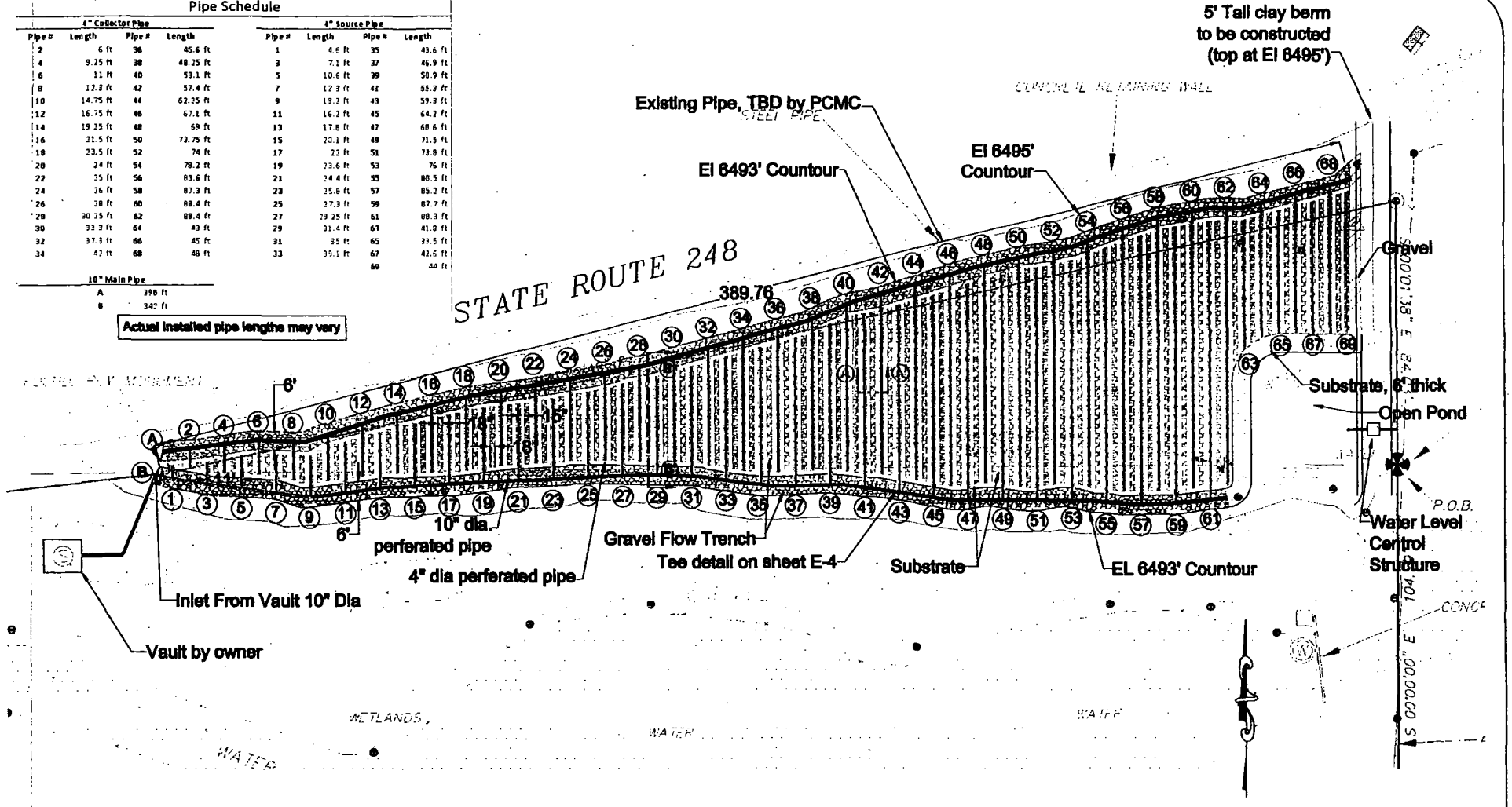
4" Source Pipe

Pipe #	Length	Pipe #	Length
1	4.6 ft	35	43.6 ft
3	7.1 ft	37	46.9 ft
5	10.6 ft	39	50.9 ft
7	12.9 ft	41	55.9 ft
9	13.2 ft	43	59.3 ft
11	16.2 ft	45	64.2 ft
13	17.8 ft	47	68.6 ft
15	20.1 ft	49	71.5 ft
17	22 ft	51	73.8 ft
19	23.6 ft	53	76 ft
21	24.4 ft	55	80.5 ft
23	25.8 ft	57	85.2 ft
25	27.3 ft	59	87.7 ft
27	29.25 ft	61	88.3 ft
29	31.4 ft	63	41.8 ft
31	35 ft	65	39.5 ft
33	39.1 ft	67	42.6 ft
		69	44 ft

10" Main Pipe

A	398 ft
B	342 ft

Actual installed pipe lengths may vary



Biocell for Zinc Removal From the Park City Prospector Drain

Client: Park City
Address: Prospector Park
City/State: Park City, UT, 84060

University Of Missouri - Rolla
211 Butler-Carlton Hall
1870 Miner Circle
Rolla, MO, 65401
Phone: (573) 341-4491
www.umr.edu

Drawn: DMW Date: 5/30/07
Approved: MWF Date:
Scale: 1" : 40'
Sheet: 11x17

Sheet Description: Site Layout
Sheet Number: E-1

PERFORMANCE OF A FULL-SCALE HORIZONTAL-FLOW WETLAND FOR ZINC[1]

Mark Fitch[2] and Jeff Schoenbacher

Abstract. Park City constructed a horizontal-flow wetland in the fall of 2008 based on research performed at lab-scale and two small pilot-scale systems operated on-site for four years. The influent is shallow ground water, that originates from an historic silver mine tailings pond which is impaired with zinc and has low iron with a pH of roughly 6.5. The performance of the small systems is compared to the full-scale system results. Additionally, challenges in constituent relations, construction, and start-up will be discussed.

---

[1] Paper was presented at the 2009 National Meeting of the American Society of Mining and Reclamation, Billings, MT Revitalizing the Environment: Proven Solutions and Innovative Approaches May 30 – June 5, 2009. R.I. Barnhisel (Ed.) Published by ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

[2] Mark Fitch is an Associate Professor of Civil Architectural and Environmental Engineering, Missouri University of Science and Technology, Rolla, MO 65409-0030. Jeff Schoenbacher is Environmental Coordinator for Park City Municipal Corporation, Park City, Utah 84060-1480.

Introduction

Water pollution associated with lead mining is a substantial concern in Missouri, which produces 90% of lead mined in the United States (Benn and Cornell, 1993). Passive treatment schemes such as biocells, previously referred to as constructed wetlands, take advantage of naturally occurring geochemical and biological processes to improve the water quality with minimal operation and maintenance requirements (Gazea and Kontopoulos, 1996). In the past two decades, constructed wetlands have been used with varying success to treat acid mine drainage as well as urban runoff and industrial outfalls (Neculita et al., 2007). Research at the Missouri University of Science and Technology (formerly the University of Missouri-Rolla) has focused on quantifying removal mechanisms in bench-scale horizontal flow wetlands (Fitch et al., 2008). One result of this bench-scale work was successful removal of lead and zinc from circum-neutral mine water. Fourteen lab-scale constructed wetlands were set up treating synthetic mine effluent for up to seven yeas, with more than 90% removal of lead and 65% removal of zinc observed at hydraulic residence times of 0.45 to 4.5 days (Song et al., 2001).

That bench-scale work has been translated into a full-scale unit at Park City, Utah. This paper summarizes pilot-scale results, design and construction, and the results of the first several months of operation. The objective of this work was to reduce the zinc load within Silver Creek by treating the Prospector Drain outfall, which drains shallow ground water from a historic silver mine tailings pond. It should be noted that Silver Creek is an impaired watershed and is listed on the Clean Water Act Section 303 (d) as being impaired for high concentrations of zinc and cadmium.

Park City, now renowned for skiing, was a major silver mining town during the nineteenth century. As a result, during a century of active mining, the Park City Mining District produced millions of ounces of silver as well as a substantial amount of mine tailing waste. Mine tailing waste is known to contain elevated levels of heavy metals, which pose a threat to the environment and human health. Because of these historic impacts a modern Park City is fringed with former mines and has extensive mine tailings deposits (660 acres) throughout the city limits. One of these areas is known as Prospector

Park (CERCLIS name Silver Creek Tailings Site), which is a residential community that was developed in 1988 on top of a mine tailings pond. To accommodate the development a dewatering line was installed to convey shallow ground water from the site. Prospector Park is at an elevation of 7,200' and is situated along the northern side of Silver Creek and is located on the eastern side of the Park City limits. Researching the development plans for the area revealed little in regards to the layout of the dewatering line and clear geological formation as a source. The outfall characteristics are summarized in Table 1. The water composition is fairly constant and does not correlate to season, but flow is seasonally affected. This is assumed to be due to the influence of Silver Creek being a losing stream along Prospector Park.

Table 1. Characteristics of water from the Prospector outfall

Parameter	Unit	Average[a]	Range
Flow	gal/d	140,000	117,000-252,000
pH		6.27	6.0 – 7.1
Zn	mg/L	7.05	2.68 – 14.137
Cd	mg/L	0.045	0.01 – 0.083
Pb	mg/L	0.055[b]	BDL[b] – 0.58
Fe	mg/L	1.67	0.02 – 17.4
Sulfate	mg/L	650	590 – 760
Hardness	mg/L as $CaCO_3$	978	630 – 1170
TDS	mg/L	1926	1420 – 2270
TSS	mg/L	36	1 – 64[c]

[a] Based on monthly sampling between June 2003 and June 2007.

[b] Including 17 samples below detection limit (BDL, method detection limit reported as 0.001 mg/L), averaged as zero. Without samples BDL included, average is 0.094 mg/L.

[c] Excludes August 2006 sample reported as 960 mg/L.

Methods

Site Description

The Prospector Park Drain outfall conveys shallow ground water from the development that was previously a historic mine tailings pond that contributes surface water to the Silver Creek Watershed. The dewatering line is thought to span the length of the development that eventually empties into a manhole, and continues within a ten-inch concrete pipe, then outfalls on the eastern edge of the park and property line that is shared by the Bureau of Land Management (BLM). The area is shown in Figure 1. The triangular patch noted is the location used for the biocell, approximately 0.4 acres. The city owns additional property to the east (down the watershed) separated by BLM property.

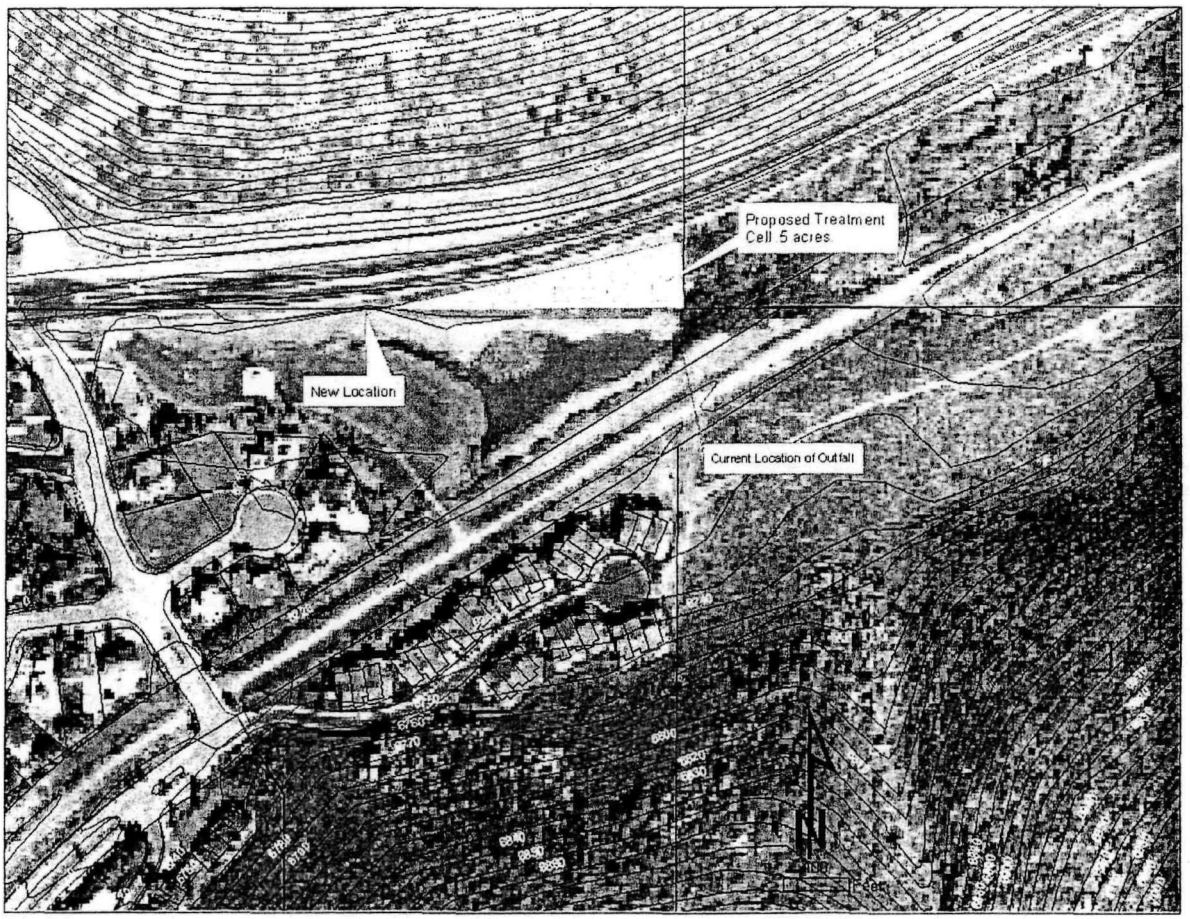


Figure 1. Prospector Park area. Labels indicate existing Prospector Outfall, biocell, and location of vault. Highway to north is State Route 248 and the gravel road on the south is

a popular bike/walk path. Note pond is bordered on north side by berm. Biocell area is the triangular area bounded by highway, berm, and BLM property line.

Outfall, Pilot, and Biocell Samples and Analytical Techniques

Discrete water samples for metal analysis were collected following EPA procedures, with analysis at Chem-Tech Laboratory (Salt Lake City, Utah) using EPA methods (i.e. metals by EPA Method 200.7, 200.8, 160.1 and 160.2). Outfall samples were collected from water originating from within the manhole and the pilot outfall. After the by-pass vault was constructed for the biocell, such outfall samples (influent to the biocells) were collected within that vault. Effluent samples from the pilot cells were collected from the end of the effluent pipe. Effluent samples for the biocells were collected from the Agri-Wier, which feeds the outfall pipe. Flow rate was measured by a flow meter inside the manhole and another within the by-pass vault. Conditions within the biocell were measured using a Hach Field Monitor with probes for pH, ORP, D.O. and temperature.

Regulation and Decision Process

USEPA and the UDEQ have been investigating and evaluating mine sites within the Park City area since the early 1980's. During these evaluations, the Silver Creek Tailings Site now known as Prospector Park was investigated to determine potential environmental impacts. As a result, USEPA proposed listing the Prospector Park area on the National Priorities List (NPL) in 1985. This resulted in a controversial scenario with the community, since much of Prospector Park was being developed into a residential subdivision within the city. USEPA's concerns with the development of the area were based on exposure risks of residential households being situated within an area known to contain mine tailing waste. The hazardous constituents of concern that were known to be within the mine tailing waste are lead, arsenic, and cadmium.

The proposal to list the Site on the National Priority List (NPL) generated a great deal of controversy within the community. PCMC and most city residents were opposed to NPL listing, while EPA maintained the site should be NPL listed. Furthermore, PCMC

believed the situation at Prospector presented only minimal risks and could be remedied with local corrective actions resulting in the city capping vacant properties in 1985. Also, during this time, PCMC sought congressional intervention to ensure the site was not listed on the NPL. As a result, a line item was included in the 1986 SARA amendments (Section 120 pg. 666), which removed the site from consideration from the NPL and precluded future considerations to the NPL unless significant new information was discovered. The following is the language contained within the SARA amendment:

> (p) SILVER CREEK TAILINGS.—Effective with the date of enactment of this Act, the facility listed in Group 7 in EPA National Priorities List Update #4 (50 Federal Register 37956, September 18, 1985), the site in Park City, Utah, which is located on tailings from noncoal mining operations, shall be deemed removed from the list of sites recommended for inclusion on the National Priorities List, unless the President determines upon site specific data not used in the proposed listing of such facility, that the facility meets requirements of the Hazard Ranking System or any revised Hazard Ranking System.

To allay the controversy and seek consensus based technical information regarding the situation at Prospector, PCMC, EPA, and UDEQ developed a series of scientific studies that focused on air, water, and health. These studies were very broad with ATSDR conducting the health and blood lead assessment, USEPA conducting the ambient air study, and UDEQ/USGS conducting ground and surface water quality study. While these studies were being conducted, PCMC also began developing a local ordinance to ensure effective capping of the area. These actions culminated in 1988 with two EPA letters giving qualified approval of PCMC proposal for a local ordinance and the subsequent enacting of the ordinance. As a result, PCMC is committed to the remediation of historic mine tailing impacts and controlling the environmental and human health risks with institutional controls. These institutional control obligations can be found within PCMC Annual reports that are posted at http://mapserv.utah.gov/ParkCityGIS/.

Nonetheless, the regulatory driver for the Prospector Outfall was the Silver Creek Total Maximum Daily Load (TMDL) developed by the Utah's Department of

Environmental Quality (DEQ) and mandates a 50% reduction in zinc and cadmium within the watershed. As defined in the Silver Creek TMDL the endpoint goal for zinc as set at 0.39 mg/L and cadmium be limited to 0.00076 mg/L. The whole watershed approach used in setting TMDL values melded well with the approach generally used in the area for environmental concerns, namely to involve all constituents. For the Prospector Outfall, that constituency included regulatory bodies: the United States Environmental Protection Agency (EPA), Utah DEQ, U.S. Fish and Wildlife, and the Bureau of Land Management, which owns land adjacent to the site and along the watershed. In addition to regulatory agencies, PCMC and mining corporations are included in the constituent group. Representatives of the constituents meet as needed to discuss problems and arrive at agreements, with meetings scheduled by the EPA, who kindly provide a professional facilitator.

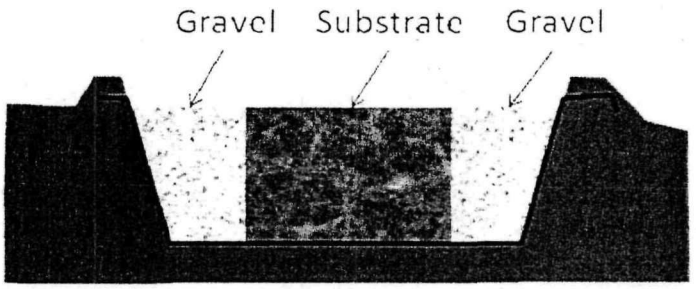
Park city is a significant tourist destination, and given its history as a mining town, has benefitted from approaching pollution issues as problems to be solved. In the case of the Prospector Outfall, the joint concerns of zinc load to Silver Creek and Park City's environmental approach led the city to examine various potential solutions and decide on a biocell. After discussions with Missouri S&T (previously named the University of Missouri-Rolla) about research on horizontal flow wetlands (Fitch et al, 2008; Song et al, 2003), PCMC decided to test a biocell at small pilot scale. In May of 2005 the results were presented to PCMC leaders and met with approval. The constituency met in January of 2006 and indicated no objection to construction of a small full-scale biocell on PCMC property as a demonstration.

Pilot-scale Biocells

A small pilot-scale biocell was constructed at the site in May of 2004. A hole of approximately six foot by four foot and three foot deep was excavated by backhoe. The hole was then lined with 'pond liner' plastic and filled by hand. Small berms were formed atop the liner at ground level around the wetland with excavated soil. The pilot-scale wetland design is shown in Figure 2. The pilot-scale biocell received inflow from a small submersible pump located in the existing manhole. A garden hose equipped with a

ball valve delivered the water to the unit. The garden hose was buried under a few inches of soil to prevent freezing. Influent flowed into a foot-and-a-half-thick (in the flow direction) gravel lens to allow equal distribution of flow into the substrate. Similarly, a gravel lens on the effluent side of the substrate led to the effluent pipe, a short length of two-inch PVC. This effluent lens was roughly three foot in length. Materials all came from local sources. The substrate, which was a foot-and-a-half-thick, was a mix of pine wood shavings (60% v/v), sewage sludge and cow manure (5% v/v); percentages given are approximate. The substrate was mixed in a wheelbarrow by shovel and then deposited in the biocell in layers with the gravel to maintain roughly vertical abutment between gravel and substrate. The manure and sewage sludge quantities were limited, so the upper quarter of the substrate lacked for these components.

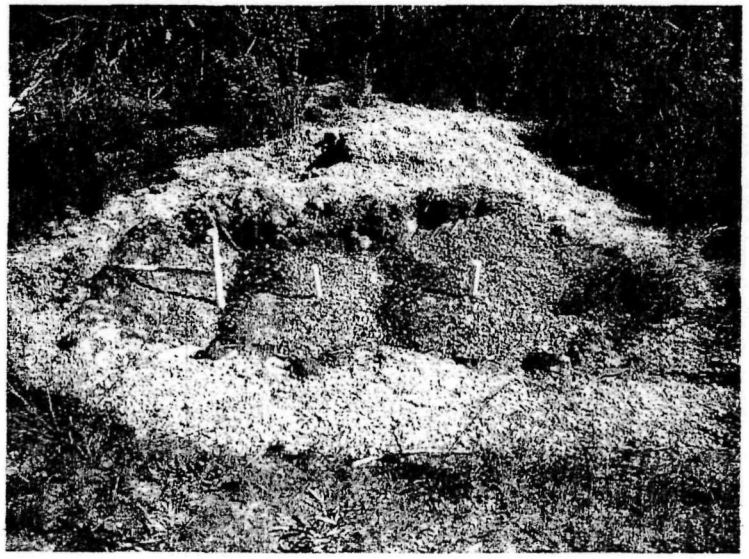
(a)



(b)

Figure 2. (a) Section showing first pilot unit design. (b) image of construction.

A second pilot-scale biocell, shown in Figure 3(a), was constructed in late May of 2006 with a similar design but a differing substrate composition. Dimensionally, the second unit was seven foot by four and three feet deep. In addition to a different substrate, there were two significant differences in design (1) the substrate was formed in two sections, each 18 inches thick with a separation of 18 inches of gravel, and (2) the second biocell had influent delivery and effluent collection each by the piping system shown in Figure 3(b), which included an end cap to allow influent or effluent sampling. The substrate was again locally available material mixed by hand in a wheelbarrow, and the composition used was 70% v/v pine shavings, 20% v/v gravel, and 10% v/v cattle manure. A six-inch layer of a 50-50 substrate and gravel mix was placed in the bottom of the cell, and above this was placed influent and effluent gravel layers sandwiching a foot-and-a-half thick (again, measured in the horizontal flow direction) substrate layer. The same garden hose was used to supply influent, but the hose was brought into the one-inch feed pipe shown in Figure 3 such that the end of the hose was visible when looking down the vertical pipe. Flow was initiated immediately, and was maintained at about 0.3 gallons per minute.

(a) 

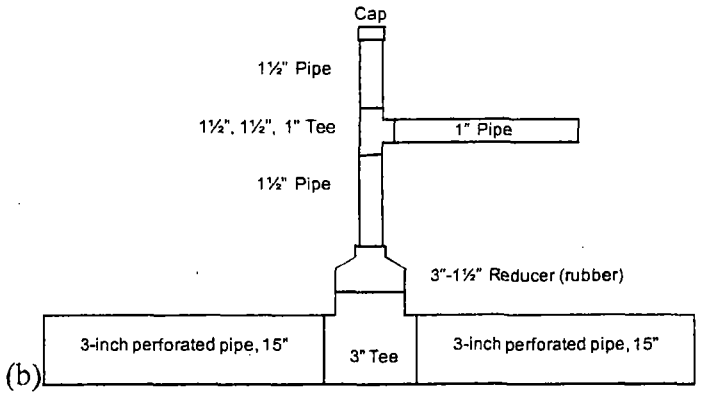


Figure 3. Second pilot-scale biocell. (a) image form construction. (b) effluent piping.

Design, Bidding and Construction

Because the pilot-scale units treated water through 18 inches of substrate, the full-scale design for horizontal flow used the same dimension of substrate. The triangular area to be used presented a challenge, as the simplest design would be similar to a filter press, alternating layers of substrate with influent and effluent in a series of bands with one end acting as the supply and the other as the uptake. However, concern over hydraulic short-circuiting resulted in the basic design including not one but two layers of substrate separated by a gravel layer. In this way water might channel through one layer of substrate but then would have to flow through a second layer. Thus the water flow path was designed as gravel (influent), substrate, gravel (redistribute flow), substrate, gravel (effluent). This series of layers was applied to the filter press idea, resulting in a theoretical design as shown in Figure 4.

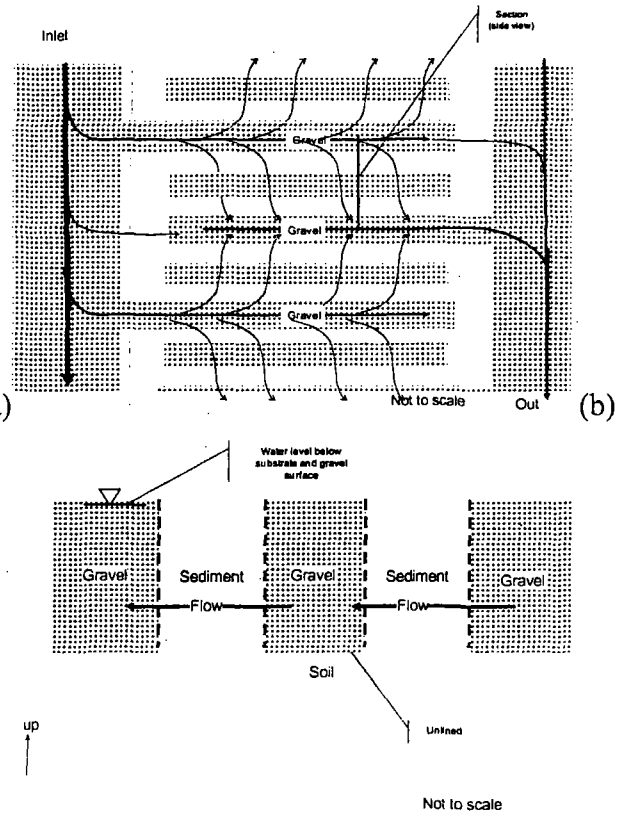


Figure 4. Theoretical layer design; (a) plan view, solid fill is substrate, (b) section view.

The design was reviewed for PCMC by Nature Works Remediation Corporation of Canada, and with their input the substrate was specified as 50% wood shaving or chipped wood, 30% cow manure, and 20% clean limestone gravel of size ¾ inch or smaller. Gravel for the distribution channels was specified as one inch or larger. Due to significant head loss if the gravel solely transported the water, pipes were placed in the bottom of the unit. The main delivery and collection pipes, located in the channels in Figure 4(a) on the left and right sides, respectively, were ten-inch plastic. These were joined to four-inch plastic perforated pipe which ran down the center of each gravel 'finger' extending from the inlet or outlet side. The isolated gravel lenses for flow redistribution contained no pipes.

The existing manhole was replaced with a by-pass vault costing $71,000. This was required to control flow, as the area available was judged to be insufficient for complete treatment of the 0.14 MGD flow, instead the unit was estimated at 0.05 MGD. In the future, all flow might go to this unit for partial treatment and then continue on to a

second cell elsewhere. The vault thus includes a flow meter to control flow to the biocell in a six-inch pipe and an overflow that channels excess flow into the original outfall pipe.

Effluent flows to a small, 40 foot by thirty foot open-air pond at the south-east corner of the biocell. This pond has a ten-inch collector pipe, which goes through the five-foot clay-lined berm defining the east end of the biocell. Due to concerns expressed by regulators, the entire unit was lined with six inches of clay to prevent exchange of water to the underlying soil. Water level in the pond is controlled by a commercially available adjustable weir in the berm. This placement was chosen to prevent freezing of the outlet structure.

Sampling ports were installed in the cell, two-inch plastic pipe extending vertically to six inches above the clay layer and topped with an end cap. Sampling also is possible at the influent vault structure and the effluent pond or pipe.

Construction occurred in September of 2008. Cost estimation by Missouri S&T for the initial bid process in 2006 was significantly less than the bids received; the cost estimate was $98,000, bids were $525,000. The biocell was rebid in 2008, and the successful bid was $325,000. One challenge for the contractor was how to place the alternating 'trenches' filled with gravel and substrate. The contractor's solution, shown in Figure 5, was a wood and steel form lifted and filled by trackhoe with manual assistance. Because of concerns over potential winter freezing, the entire biocell was covered with a twelve-inch layer of wood chips. This was a change order resulting in another $86,000 cost for the final construction of the biocell.

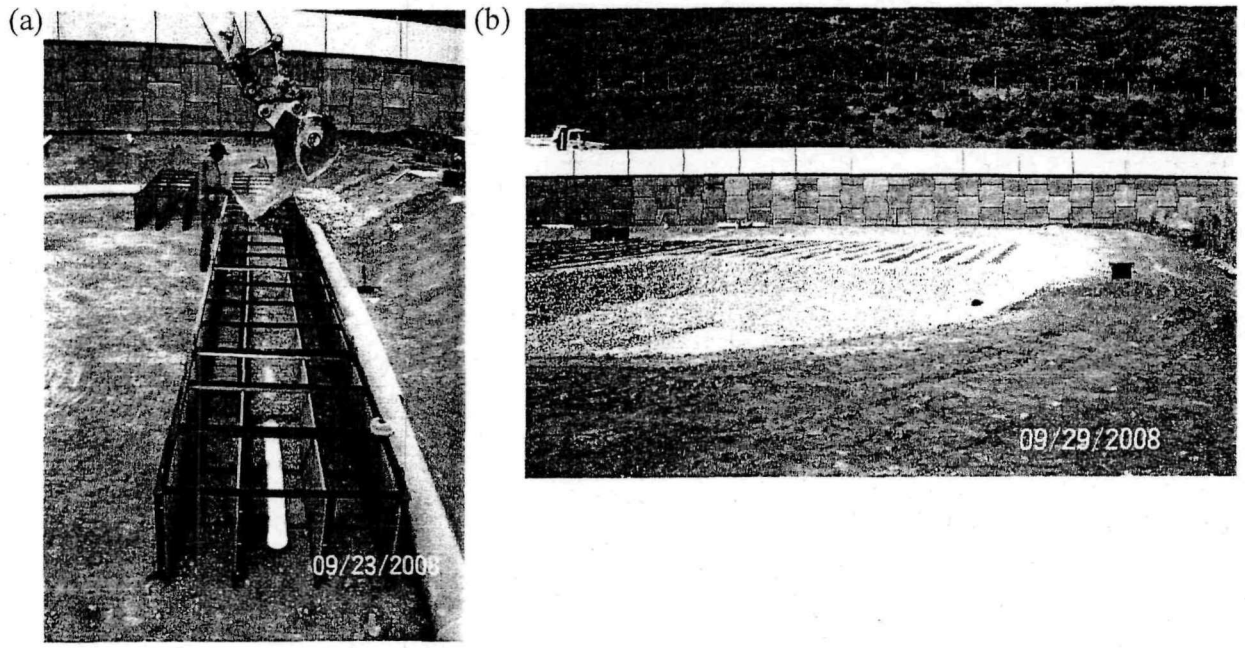


Figure 5. Biocell construction. (a) Placement of gravel and substrate in biocell. (b) View of construction showing effluent pond in foreground. Dark box atop berm at right is top of the water control structure.

Results

This work focused on the design and operation of a biocell for an unusual metal-tainted water of pH 6.5 containing negligible iron but significant zinc. The pilot cells showed promising removal, and the initial results from the full-scale biocell are encouraging.

Pilot-Scale Biocells

The first biocell operated from May 2004 to May 2006, with data collected roughly monthly through November of 2005. One challenge was large snowfall limiting access to the unit without significant hand digging of snow. Both units were found to have formed a 'snow cap', with air space above the biocell surface, indicating sufficient heat came from the influent water, which maintains a mid 50s °F temperature, to prevent freezing. The second biocell, which had a higher content of organic (pine shavings) and bacterial seed (cattle manure) operated from late May 2006 until June 2007. Performance is summarized in Figure 5 and Table 2. Broadly stated, both biocells showed significant

removal of zinc during the full period of operation, with great variability in effluent concentration. Sulfate removal was demonstrated, but only small amounts in the first biocell, possibly related to the lack of bacterial seed (manure and sludge) in the top portion of the substrate of this biocell. The second pilot-scale biocell demonstrated greater sulfate removal during the first three months of operation (90 – 150 mg/L removed, rate of 520 g/d/m^3 based on estimated substrate volume of 0.38 m^3) that declined significantly thereafter to an average of 13 mg/L (56 g/d/m^3).

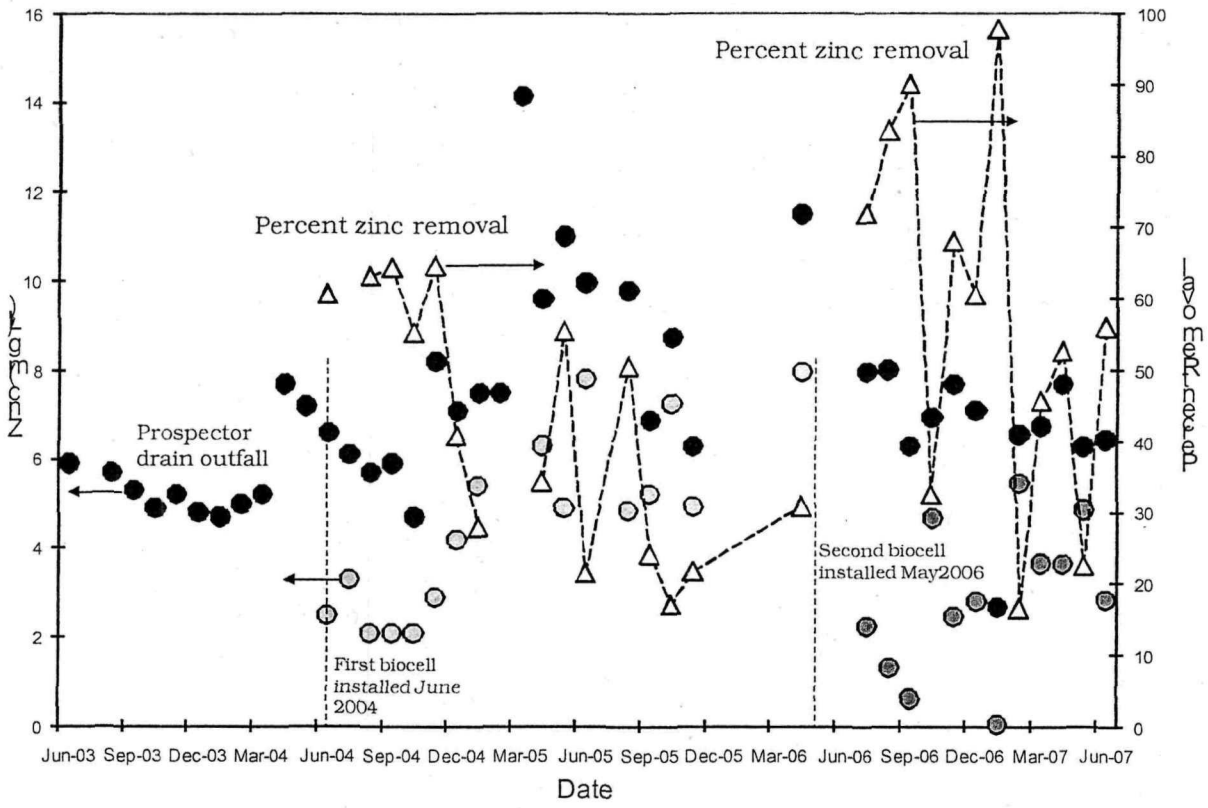


Figure 5. Pilot Scale Results. Solid circles are influent (Prospector outfall) zinc concentration (left axis), circles filled with blue are effluent concentration from first pilot-scale biocell, solid circles filled with green are effluent concentration from second pilot-scale biocell, and triangles show calculated removal (right axis) through biocell.

Table 2. Pilot-scale biocell performance.

Parameter and units	Biocell 1 average	Biocell 1 range	Biocell 2 average	Biocell 2 range
Influent Zn (mg/L)	8.2	4.7 – 14.1	6.7	2.7 – 8.0
Effluent Zn (mg/L)	4.0	2.1 – 8.0	2.9	0.06 – 5.46
Zn Removal (%)	45	17 – 98	58	17 – 98
Influent Cd (mg/L)	0.05	0.03 – 0.08	0.05	0.01 – 0.06
Effluent Cd (mg/L)	0.01	BDL[b] – 0.08	0.02	0.006 – 0.06
Cd Removal (%)	77	36 – 100	64	36 – 88
Sulfate removed[a] (mg/L)	24	-40 – 80	42	-10 – 150

[a] Influent sulfate averages 650 mg/L, range 590 – 760 mg/L.

[b] BDL – below detection limit, reported as 0.001 mg/L.

Biocell Start-Up

The biocell was filled slowly after construction was completed (mid-October of 2008) at a rate of 10 gal/min. Once the biocell was filled to a few inches below the substrate surface as determined from the water level in the effluent pond, flow was shut off and the ORP, pH, and D.O. were monitored at the sample ports in the biocell. The influent water has an ORP of above 100 mV and has very high D.O. concentrations, generally above 20 mg/L.

Table 3. Biocell start-up to anaerobic conditions.

Date[a]	Sample port near inlet		Sample port near middle		Effluent pond or sample near end of biocell	
	ORP (mV)	D.O. (mg/L)	ORP (mV)	D.O. (mg/L)	ORP (mV)	D.O. (mg/L)
7 Nov	ND[b]	ND	-175	BDL	74	6.6
12 Nov	ND	ND	89	2.8	ND	ND
18 Nov	-82	3.4	20	2.7	-130	0.5
24 Nov	-196	0.2	-142	0.3	-187	0.2

[a] Biocell was filled as of 27 October. Flow was started on 24 November at 8.5 gal/min and declined to 5 gal/min by 3 December.

[b] ND – Not determined.

The data in Table 3 shows that the biocell slowly went anaerobic; requiring approximately four weeks after water was added to reach consistently negative ORP values. Prior to this time, however, H_2S was detected by nose at several sampling ports when opened for sampling. pH was also monitored, and was found to increase slightly over the period of no flow from around 7.0 to 7.5.

Operation began on 24 November, with flow started at 8.5 gal/min. Water was determined to be flowing from the effluent on 3 December. Sampling on that date showed ORP of 163 mV in the influent and -211 at the effluent pond. Temperature of the water dropped from 57 °F in the influent to 42 °F at the open effluent pond. pH changed slightly, from 6.0 in the influent (vault) to 6.8 at the effluent. The water quality samples taken that date also showed good performance as demonstrated in Table 4.

Table 4. Biocell performance.

Date	Influent Zn (mg/L)[b]	Effluent Zn (mg/L)[b]	% Zn Removal	Influent Cd (mg/L)[b]	Effluent Cd (mg/L)[b]	% Cd Removal
3 Dec	6.83	0.19	97	0.053	BDL	98[c]
23 Dec	6.72	0.05	99	0.050	BDL	98[c]

[a] Flow was started on 24 November and effluent flow was observed on 3 December.

[b] Values are for dissolved metal; total metal was slightly higher.

[c] Conservative, assumes effluent at reported detection limit, 0.001 mg/L.

Acknowledgements

This project was funded by Park City Municipal Corporation. The Missouri S&T work benefitted from past support by the Midwest Hazardous Substance Research Center (National Center for Environmental Research (NCER) STAR Program, EPA) under Grant R82877001-0. We wish to thank for valuable criticism and support: Al Mattes and Bill Duncan with Nature Works remediation Corporation; Jim Gusek, senior consultant

with Golder Associates; and David Reisman, Director, ORD Engineering Technical Support Center, National Risk Management Research Laboratory, U.S. EPA.

Literature Cited

Benn, F.W. and W.L Cornell. 1993. Removal of Heavy Metals from Missouri Lead Mill Tailings by Froth Flotation. Separation Science and Technology, 28(1-3): p. 733-746.

Fitch, M., Burken, J., and C. Ye. 2008. Measured and Modeled Removal Mechanisms for Bench-Scale Constructed Wetlands Receiving Lead Mine Water. In R.I. Barnhisel (ed.) Proc. 2008 Natl. Meeting of the Amer. Soc. of Mining and Reclamat., (Richmond VA, Jun. 14-19, 2008) ASMR, 3134 Montavesta Rd., Lexington, KY 40502.

Gazea, B.A., and K. Kontopoulos. 1996. A Review of Passive Systems for the Treatment of Acid Mine Drainage. Minerals Engineering, 9(1), p. 23-42.

Neculita, C.M., Zagury, G.J., and B. Bussiere. 2007. Passive treatment of acid mine drainage in bioreactors using sulfate-reducing bacteria: critical review and research needs. Journal of Environmental Quality. 36, p. 1-16.

Song, Y., Fitch, M., Burken, J., Nass, L., Chilukuri, S., Gale, N., and C. Ross. 2001. Lead and Zinc Removal by Lab-Scale Constructed Wetlands. Water Environment Research, 73(1), p. 37-44.

TAB #10

State of Utah

Department of
Environmental Quality

Richard W. Sprott
Executive Director

DIVISION OF ENVIRONMENTAL
RESPONSE AND REMEDIATION
Brad T Johnson
Director

JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

ERRC-131-08

July 18, 2008

Jerry Fiat
King Development Group, LLC
P. O. Box 4581
Park City, Utah 84060

Ron Ivie
Park City Municipal Corporation
445 Marsac Avenue
Park City, Utah 84060

RE: ***Alice Lode Voluntary Cleanup Site, Park City, Utah***

Dear Mr. Fiat and Mr. Ivie:

The Utah Department of Environmental Quality (UDEQ) has executed the Voluntary Program Cleanup Agreement AMENDMENT for the Alice Lode Site, Park City, Summit County, Utah. Based on the information included with the amendment, the UDEQ accepts the co-applicant, Park City Municipal Corporation, into the Voluntary Cleanup Program (VCP). Please find enclosed a copy of the executed Amendment.

Please note that the VCP is entirely voluntary and, as such, the Applicant may withdraw from the VCP or terminate the agreement at any time and for any reason. Should you have any questions regarding this letter, the agreement or the voluntary cleanup process, please contact Ms. Yeomans at (801) 536-4092.

Sincerely,

Elizabeth Yeomans

Elizabeth Yeomans, L.P.G.
Voluntary Cleanup Program
Division of Environmental Response and Remediation

EAY/lfh

Enclosure

cc: Steve Jenkins, E.H.S., M.P.H., Director, Summit County Public Health Department
Kathy Harris, AMEC Earth & Environmental

AMENDMENT TO UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY VOLUNTARY CLEANUP PROGRAM APPLICATION AND VOLUNTARY CLEANUP PROGRAM AGREEMENT

Name of Voluntary Cleanup Program Property/Site: Alice Lode, VCP C043
Date of Original Voluntary Cleanup Program Application: July 7, 2005
Date of Original Voluntary Cleanup Program Agreement: September 29, 2005
Original Voluntary Cleanup Program Applicant Information:
Applicant: King Development Group LLC
Contact Person: Mr. Jerry Fiat Title: Member
Organization: King Development Group LLC Phone: (435) 513-1273
Address: Post Office Box 4581
City: Park City State: Utah Zip Code: 84060

Purpose of Amendment: The purpose of this Amendment to the Utah Department of Environmental Quality Voluntary Cleanup Program Application and Voluntary Cleanup Program Agreement (Amendment) is to add an applicant to the Original Voluntary Cleanup Program Application ("Application") and Original Voluntary Cleanup Program Agreement ("Agreement") referenced above and to modify the legal description in the Agreement.

A. APPLICATION AMENDMENT

King Development Group LLC, (King) the original applicant, and Park City Municipal Corporation (PCMC), the additional applicant, request the Executive Director of the Utah Department of Environmental Quality (UDEQ) (King, PCMC and UDEQ collectively "parties") to accept PCMC as an additional applicant to the Voluntary Cleanup Program for the above referenced site. In furtherance of that objective, King and PCMC incorporate by reference the Application modified as follows.

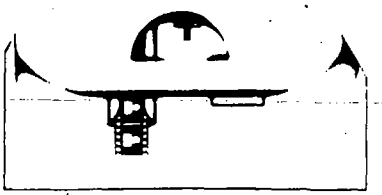
1. ADDITIONAL APPLICANT FORM

The Application is amended to add the Program - Additional Applicant Form below.

Program Application - Additional Applicant Form

RECEIVED
PARK CITY MUNICIPAL CORP
JUL 25 2008
BUILDING DEPT.

Applicant: Park City Municipal Corporation (PCMC)
Contact Person: Jeff Schoenbacher Title Environmental Coordinator
Organization: Park City Municipal Corporation Phone: (435) 615-5058
Mailing Address: 445 Marsac Avenue
City: Park City State: Utah Zip Code 84060
Interest in Property: PCMC owns a portion of the property as described in the original application.



2. JOINT AND SEVERAL LIABILITY

King and PCMC acknowledge that the Application identifies the person to whom billing should be directed is Jerry Fiat. King and PCMC acknowledge that the Application imposes joint and several liability on all applicants for payment of the UDEQ costs of review and oversight. King and PCMC hereby reiterate their agreement to be held jointly and severally liable. In its sole discretion, the UDEQ may accept payments from either or both King and PCMC to apply toward the balance due.

3. CORRECTNESS OF INFORMATION

King and PCMC acknowledge and agree that information contained in the Application and in the UDEQ's Voluntary Cleanup Program file for Alice Lode, VCP C043, is true and correct to the best of their knowledge and belief except as specifically modified through this Amendment.

4. COORDINATION

King and PCMC appoint Mr. Jerry Fiat of King to take the lead in dealing with administrative, technical and financial issues under the program and to serve as the primary contact between the King and PCMC and the UDEQ. Mr. Jerry Fiat shall coordinate between the applicants as necessary. King and PCMC are jointly responsible for the work conducted, the representations made and the costs incurred under the program.

5. EFFECTIVE DATE

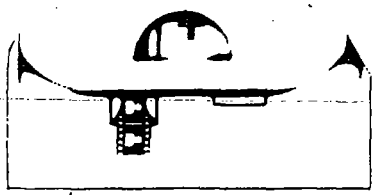
UDEQ'S acceptance of this Application Amendment is effective upon the date the Amendment is signed by the UDEQ.

B. AGREEMENT AMENDMENT

Except as expressly modified by this Amendment, the Original Voluntary Cleanup Program Agreement referenced above (Agreement) shall remain in full force and effect.

1. ADDITIONAL APPLICANT

The first sentence of section I. (A) of the Agreement is amended and restated as follows: "This Agreement is entered into voluntarily by King Development Group LLC and by Park City Municipal Corporation collectively referred to as Applicant hereafter, and by the Executive Director of the Utah Department of Environmental Quality (UDEQ)."



2. ADDRESSES FOR ALL CORRESPONDENCE

Section V. (B) of the Agreement is amended and restated as follows:

"Documents to be submitted to the UDEQ should be sent to:

Elizabeth Yeomans, Project Manager
UDEQ-Division of Environmental Response and Remediation
168 North 1950 West
Salt Lake City, Utah 84116
Phone: 801-536-4092
Facsimile: 801-536-4242
eyeomans@utah.gov

Section V. (C) of the Agreement is amended and restated as follows:

Documents to be submitted to the Applicant should be sent to

Mr. Jerry Fiat, Member
King Development Group, LLC
P.O. Box 244
Park City, Utah 84060
Phone: (435)-513-1273
Facsimile: (435) 645 0744

And to

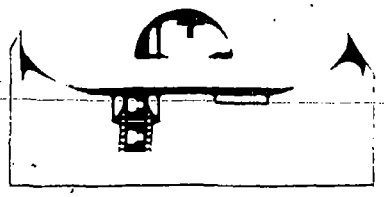
Jeff Schoenbacher
Environmental Coordinator
Park City Municipal Corporation
445 Marsac Avenue
Park City, Utah 84060
Phone: 435-615-5058
Facsimile: 435-615-4906
jschoenbacher@parkcity.org

3. EXHIBIT A LEGAL DESCRIPTION

Exhibit A attached to the Agreement is hereby amended, restated, and replaced by Exhibit A attached hereto.

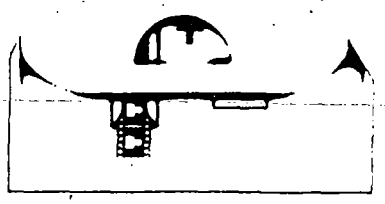
4. EFFECTIVE DATE

The effective date shall be the date on which this Amendment is signed by the Executive Director or his authorized representative.



Legal Description of the Alice Lode-MS 3331 together with the Park City Water Company Tract

Commencing at the Quarter Corner common to Sections 16 & 21, T.2S., R.4E., S.L.B.&M., Thence S 20°05'44" E, 1,661.56 feet to Corner No.1 of the Alice Lode MS-3331; Thence N 01°48'00" W along line 7-1 of said Alice Lode MS-3331, 357.59 feet to Corner 7 of said Alice Lode MS-3331; Thence N 36°04'27" E along line 6-7 of said Alice Lode MS-3331, 279.00 feet to the Point of Beginning; Thence continuing along said line 6-7 N 36°04'27" E, 380.92 feet to a point on Line 2-3 of the Newell Lode, USL-653; Thence N 56°36'34" E along said line 2-3, 378.21 feet to a point on the Westerly Boundary of the 'Subdivision No.1 of Millsite Reservation' (dated 06/25/1887) as said line is currently occupied and evidenced by extant survey monuments and documents of record; Thence S 00°26'00" W along said Westerly Line, 748.61 feet to a point on line 3-4 of said Alice Lode MS-3331; Thence S 30°58'27" W along said line 3-4, 349.20 feet to Corner 3 of said Alice Lode MS-3331; Thence S 07°38'27" W along line 2-3 of said Alice Lode MS-3331, 197.78 feet to a point on line 1-2 of the Park View Lode USL-655; Thence N 88°09'06" W along said line 1-2 of the Park View Lode USL-655, 273.26 feet to a point on line 1-2 of said Alice Lode MS-3331; Thence N 59°26'30" W along said line 1-2 of the Alice Lode MS-3331, 173.91 feet to a point on line 1-2 of the Huron Mine Lode USL-256; Thence N 66°41'14" E along said line 1-2 of the Huron Mine Lode USL-256, 108.84 feet to Post 1 of said Huron Mine Lode USL-256; Thence N 29°43'52" E, 198.26 feet to a point; Thence N 33°28'21" E, 96.51 feet to a point; Thence N 25°06'47" W, 370.00 feet to the Point of Beginning; Containing 10.19 acres, more or less.



RECEIVED
JUN 2 6 2008
DEQ
Environmental Response & Remediation

IT IS SO AGREED

IN WITNESS WHEREOF, the parties sign and cause this Amendment to be executed:

Applicant:

King Development Group LLC

By: _____ Name: Yoram Jerry Fiat
(signature of authorized representative) (print or type)

Date: June 25, 2008 Title: Member

Company: King Development Group LLC. Phone: (435) 513 1273

STATE OF UTAH _____)
:ss.
COUNTY OF Summit)

On this 25th day of June, 2008, personally appeared before me, Yoram Jerry Fiat who duly acknowledged that s/he signed the above Amendment as an authorized representative of the Applicant, King Development Group LLC.

_____
NOTARY PUBLIC

Residing At: 1960 Sidewinder #9
Park City, UT 84060

My Commission Expires: 2010

ANITA L PRICE
Notary Public
State Of Utah
My Commission Expires Jan. 10, 2010
1960 Sidewinder Dr. #211, Park City Ut 84060

Applicant:

Park City Municipal Corporation

By: _____
(signature of authorized representative)

Name: Thomas Bakaly
(print or type)

Date: 7/9/08

Title: City Manager

Company: Park City

Phone: (435) 615-5180

STATE OF UTAH UT)

:ss.

COUNTY OF Summit)

On this 9th day of July, 2008, personally appeared before me, Thomas Bakaly who duly acknowledged that ~~s~~/he signed the above Amendment as an authorized representative of the Applicant, Park City Municipal Corporation..

_____
NOTARY PUBLIC

Residing At: Salt Lake County

My Commission Expires: 3-11-12

Notary Public
DAWN M. JENSEN
[illegible] Marsac Ave., P.O. Box 1480
Park City, Utah 84060
My Commission Expires March 11, 2012
State of Utah

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

By: Brad T Johnson
(signature of authorized representative)

Name: Brad T Johnson
(print or type)

Date: 7/16/2008

Title: Director, Division of Environmental Response and Remediation

STATE OF UTAH)
:ss.
COUNTY OF Salt Lake)

On this 16 day of July, 2008, personally appeared before me, Brad T Johnson, who duly acknowledged that he signed the above Amendment as an authorized representative of the UDEQ.

NOTARY PUBLIC
JENNIFER BURGE
140 East 300 South
Salt Lake City, Utah 84111
My Commission Expires
September 11, 2008
STATE OF UTAH

Jennifer Burge
NOTARY PUBLIC

Residing At: SLC

My Commission Expires: 9-11-08

TAB #11

MITIGATION WORK PLAN
ALICE LODE
VOLUNTARY CLEANUP PROGRAM
PARK CITY, UTAH

Prepared By:

AMEC Earth & Environmental
9865 South 500 West
Sandy, Utah 84070

For:

King Development Group, LLC
P.O. Box 4581
Park City, Utah 84060

August 3, 2006

Job No. 5-814-000223

TABLE OF CONTENTS

Page

FIGURES

APPENDICES

MITIGATION WORK PLAN
VOLUNTARY CLEANUP PROGRAM
ALICE LODE SITE
PARK CITY, UTAH
(Revised August 3, 2006)

1.0 INTRODUCTION

The purpose of this environmental Mitigation Work Plan is to present the operational, construction, and sampling procedures that will be utilized during the proposed mitigation of the mine tailings and impacted soils within Alice Lode. AMEC Earth & Environmental Inc., (AMEC) has been engaged by King Development Group, LLC (KDG) to prepare this report on behalf of KDG and Park City Municipal Corporation (PCMC) the current owners of the property within Alice Lode as subsequently defined in the following paragraph. For the purposes of this report, the "Owner" is defined as the current owners as well as subsequent owners of the land within Alice Lode. The Mitigation Work Plan is being completed under the Utah Division of Environmental Response and Remediation (UDERR) Voluntary Cleanup Program (VCP). The procedures to conduct mitigation include, but are not limited to,

- Mitigating human and environmental exposure to the impacted soil through off-site disposal of impacted media and institutional controls,
- Mitigation of impacted soil and mine tailings through removal and disposal,
- Institutional control through capping and restricting access, and
- The documentation of the location of the disposal site(s) and final characterization of the remaining mitigated soils.

As depicted on Figure 1, Vicinity Map, Alice Lode (Site) is located in Park City, Utah. The Site is located in the area of Woodside Gulch at the intersection of King Road and Ridge Avenue in Park City, Utah. The approximate geographical coordinates of the center of the Site are 40° 38' 11" North Latitude and 111° 29' 52" West Longitude. Figure 1 shows the USGS Topographic Map in which the Site area has been highlighted in the northeast quarter of Section 21, Township 2 South, Range 4 East, Salt Lake Base and Meridian. Figure 2 shows the Site boundaries and an area owned by KDG and PCMC that includes the reservoir and strip of land bisecting the Site to the reservoir. The total combined surface area of the Site is approximately 10.17 acres.

To include PCMC property in the VCP mitigation activities, a VCP application addendum will be prepared and submitted to the DERR. The addendum will include a request for inclusion, with a legal description of PCMC property and a signature of PCMC authorized representative. Approval of the Mitigation Work Plan by the DERR, will allow the Owners to mitigate the Site including PCMC property as shown on Figure 2.

The cleanup under the VCP is being submitted in order to clean up the Site to allow for single family homes and associated utilities and paved streets. The lots, streets, and home locations presented in this document are still in the development stage and have not been officially

AMEC Earth & Environmental
9865 South 500 West
Sandy, Utah 84070
Telephone (801) 999-2002
Fax (801) 999-2035 www.amec.com

approved by the PCMC. Figures 2 and 3 show the proposed home locations. The final property lines of each lot have not been established at this time. The Mitigation Work Plan assumes that the development will occur simultaneously with mitigation.

As part of this development, the Owner will complete necessary mitigation to be protective of human health and the environment. The UDERR, through the VCP, has established lead action levels in the soil of 400 milligrams per kilogram (mg/kg) in a residential area, 100 mg/kg in soil for arsenic, and 2,100 mg/kg of lead in a non-residential area. In addition, consideration has also been given to PCMC's requirement for minimal loss of trees, minimal destruction and removal of vegetation and hillsides, and the Division of Water Rights (DWR) rehabilitation requirements of the intermittent stream in Woodside Gulch. Long-term management of the Site will be presented in a Site Management Plan which will be prepared upon completion of the mitigation efforts presented in this Mitigation Work Plan.

To understand current impacts to the soil, AMEC on behalf of the Owner has investigated and characterized known and potentially adverse environmental impacts to the soil at the Site. The characterization results of the various Site investigations indicate that soil areas within Alice Lode have been impacted by varying concentrations of lead and arsenic from historic mining operations. The following sections describe the Site investigations that have been completed.

1.1 HISTORICAL BACKGROUND

The Alice Lode claim was mined during the 1890's and the early 1900's. A mine shaft and drift were completed during that time period. The location of the mine shaft could not be ascertained until, in 1976, a mine portal was discovered at the Site. The mine shaft extended approximately 300 feet from the portal and dropped at an angle for another 250 feet (*The Park Record, 1976).*

During a Geotechnical study completed by AMEC in June 2006, a mine shaft was uncovered on the west side of the gravel access road as shown on Figure 2. Review of historical data indicates the mine shaft is approximately 500 feet deep and was used for exploration purposes. The mine shaft surface opening is currently covered, fenced, and signed to restrict access. The closure of the mine opening is not part of this mitigation program and will be included as part of the Site development.

Historic aerial photographs were reviewed in an effort to identify the history of development and activities at the Site and the adjacent properties. The photographs available for review cover the years 1966, 1976, 1978, 1979, 1983, 1984, 1987, 1989, 1992, 1995, 1997, 2002, and 2003. During this time period the Site and surrounding properties appear as they do today. The water tank and reservoir located to the south of the Site were present in all of the aerial photographs. There did not appear to be any active mining activities during these time periods.

2.0 ENVIRONMENTAL STUDIES

2.1 SUMMARY OF ENVIRONMENTAL STUDIES

The history and past sampling activities are detailed in the following documents. All of the documents are on file with AMEC, KDG, and the Utah Department of Environmental Quality (UDEQ).

Sampling and Analysis Results Report, Investigation of Soil Contamination, Alice Lode Voluntary Cleanup Program Site, Park City, Utah, AMEC Earth & Environmental, Inc., March 31, 2006.

Sampling Analysis Project Plan and Quality Assurance Plan, Alice Lode Site, Park City, Utah, AMEC Earth & Environmental, Inc., AMEC Earth and Environmental, Inc., September 9, 2005. (SAPP/QAP)

Report Environmental Site Assessment, Voluntary Cleanup Program, Alice Lode Site, Park City, Utah, AMEC Earth & Environmental, Inc., July 13, 2005.

Phase II Environmental Site Assessment Report for Targeted Brownfields Assessment, Alice Lode TBA, Park City, Summit County, Utah URS Corporation, dated September 2003.

The investigative activities indicate the following:

1. The Woodside Gulch area has been impacted by historical mining operations referred to as Alice Lode during the 1890's and the early 1900's. Mine tailings are present within the stream bed of Woodside Gulch within the boundaries of the Site.
2. Sampling of soil adjacent to the old unimproved road cut located on the east hillside at the Site did not indicate that mine tailings were present.
3. At the Site, lead concentrations in the soil outside of the mine tailings on either side of the stream bed within Woodside Gulch range as high as 10,000 mg/kg. Concentrations of lead in the soil greater than 400 mg/kg are present in surface soils along the east and west hillside slopes of Woodside Gulch at the Site.
4. The stream in Woodside Gulch is an intermittent stream with water flowing during spring runoff contributed by snow melt occurring in the higher elevations of the surrounding area. There is generally no continuous flow after approximately mid-summer. The intermittent stream joins with McLeod Creek which eventually joins with the Silver Creek drainage.
5. Historically, the stream in Woodside Gulch has flooded, carrying and depositing fine-grained material within the stream bed. Fine-grained fluvial deposits are present in the southern portion of the Woodside Gulch and were previously identified as mine tailings.
6. The upper reaches of Woodside Gulch and the headwaters of the intermittent stream in Woodside Gulch are located in the Silver King Mine area.

7. A gravel surfaced road bisects the Site. The gravel road is used by PCMC to access the water tank located just south of the Site. The gravel road is also used by recreational users to access trails south of the Site.
8. Two additional recreational use trails cut through the Site.

2.2 SUMMARY OF IMPACTED MEDIA

The following is a summary of impacted media discovered during the previously listed investigations.

2.2.1 Soils

Surface and subsurface soils at the Site were found to be impacted by varying concentrations of lead and arsenic. The topography of the Site is sloped in some areas up to 45 percent. The ground surface is vegetated on the hillsides with native scrub (Gambel) oak and undergrowth. The intermittent stream in Woodside Gulch is partially vegetated in some areas with little to no vegetation in areas of mine tailings. Reworking of the soil and subsurface on the hillsides which can be contributed to mining operations, is not apparent. According to AMEC's and other subsurface investigations, subsurface soils consist of clay, silt, sand loam with a gradation to boulders to the underlying bedrock. Mine tailings are approximately 3 to 5 feet thick. The maximum thickness of soil on the bedrock is approximately 2 to 3 feet. In areas, bedrock is exposed at the surface.

Based on sampling results, visual evidence of mine workings, and color of exposed rock, one area of mine tailings was verified in Woodside Gulch within the Site boundaries. Previous reports indicated two areas of mine tailings. However, further investigation of the material on the south edge of the Site within Woodside Gulch and review of historical documents indicate mine tailings are not present. The elevated lead concentrations detected in the soil in Woodside Gulch in the south area are fluvial flood deposits. It is estimated that mine tailings in the north area of the Site are up to 5 feet thick. It is estimated that approximately 3,000 cubic yards of mine tailings are present within the Site boundaries. The characterization results are discussed in detail in the *Sampling and Analysis Results Report* (SARR), *Investigation of Soil Contamination, Alice Lode Voluntary Cleanup Program Site, Park City, Utah*, dated March 31, 2006. Figures 4 and 5 show sample locations and concentrations. Figure 6 shows the extent of the lead concentration in the soil, mine tailings, and fluvial flood deposits with lead concentrations greater than 2,100 mg/kg.

Soil sampling at the Site was completed by a PCMC authorized Brownfield's assessment in 2003 and the Owner, authorized AMEC investigations in 2005. The investigations indicate that lead concentrations in soil and mine tailings at the sampling locations ranged from 67.6 to 29,875.2 mg/kg. Arsenic concentrations ranged from less than the Level of Detection (LOD) to 3,897.6 mg/kg. Lead concentrations above 2,100 mg/kg were identified in and alongside Woodside Gulch and on the northwest hillside within the Site boundaries as shown on Figure 6. The recreation trail that runs along the east hillside of Woodside Gulch contained lead concentrations ranging from 67.6 mg/kg to 8,736 mg/kg. Although some of the lead

concentrations in the soil along the trail are above the 2,100 mg/kg they do not appear to be mine tailings. The locations of areas of concentrations above 2,100 mg/kg are shown on Figure 6. The thickness of soil with concentrations above 2,100 mg/kg is estimated to be 3 feet thick. Approximately 6,000 to 7,000 cubic yards of soil with lead concentrations greater than 2,100 mg/kg are estimated to be present within the Site boundaries.

Soils impacted with lead concentrations greater than 400 mg/kg were identified along the east and west slopes of Woodside Gulch within the Site boundaries. The east and west slopes did not have any areas of obvious mine workings or tailings. Lead concentrations in the soil generally decreased with depth at each sample location. Lead concentrations along the slopes of the gulch are likely due to naturally occurring lead concentrations and dust settling along the slopes during historic mining operations. The volume of soil with lead concentrations greater than 400 mg/kg has not been calculated.

2.2.2 Groundwater

Groundwater sampling was not undertaken as part of the investigation. Regional groundwater studies in the Park City watershed are being conducted under the direction of the UDERR, Mr. Muhammad Slam. The Alice Lode Site and Woodside Gulch represent a small fraction of the regional groundwater system and it was determined that groundwater sampling would not be part of this VCP investigation and would be addressed within the regional study.

2.2.3 Air

Wind conditions for the Site vary depending on the time of year and the direction of local storms. Dry and/or dusty conditions could cause impacted subsurface soils to become airborne if the non-impacted layer of soil is removed and/or if excavation should occur. Impacted soil may potentially leave the Site through contact with workers boots, clothing, and construction equipment.

3.0 VOLUNTARY CLEANUP PROGRAM

3.1 PURPOSE

The Owner has entered into the VCP in an endeavor to facilitate the mitigation of impacted areas within Alice Lode in order for development of the Site to proceed. This Mitigation Work Plan is based on the current development plans and mitigation will proceed simultaneously with construction development. In the event circumstances dictate the need for a change in the construction schedule an amendment or modification will be made to the Mitigation Work Plan in consultation with the UDERR Project Manager.

3.2 GOALS

It is the Owner's primary goal to undertake the mitigation of Alice Lode in such a manner that issues relative to human health and the environment are eliminated through the combination of

selected removal and disposal, capping, and restricting access to areas of impacted soils that are left in place. A Site Management Plan will be developed incorporating the means and methods to restrict access and to maintain capped areas upon completion of mitigation.

To accomplish this goal, the Owner will utilize various engineering and institutional control mechanisms as discussed in Sections 3.4, 3.5, 3.6, 3.7, and 4.0.

3.3 MITIGATION OF SOILS AND MINE TAILINGS

Mitigation of soils and mine tailings will be undertaken through three primary mechanisms. These include:

1. Removal of impacted material to, and disposal at an appropriately licensed facility,
2. Leaving the soils in place and capping, and/or
3. Restricting access to the impacted soils that are to be left in-place.

3.4 MITIGATION OF GROUNDWATER

Groundwater impacts are not an issue of concern for reasons discussed previously. Mitigation efforts are not required or further discussed.

3.5 MITIGATION OF MINE TAILINGS

Visible mine tailings designated as MTB on Figure 7 and 8 will be removed and disposed at an appropriate licensed facility. At this time, Richardson Flats Repository has been identified as the disposal location. Removal methods are discussed in Section 4.0.

The stream bed in MTB outside the area of disturbance south of the turn-around will be restored by placing a filter fabric, followed by angular rock riprap. The MTB within the area of disturbance will be rehabilitated as per the preliminary development plans shown on Figure 3. A Stream Channel Alteration Permit Number 05-35064Sa was approved on February 7, 2006 for stream rehabilitation of Woodside Gulch within the Site boundaries by the Department of Natural Resources (DNR), Division of Water Rights (DWR). The permit expires on February 7, 2007. Detailed plans of rehabilitation will be submitted to the DWR after review and initial approval of the development plans by the PCMC Planning Commission and approval of the Mitigation Work Plan.

3.6 MITIGATION OF SURFACE WATER

Potential impacts from stream water flowing through Woodside Gulch have been excluded from the VCP. As previously discussed, regional groundwater studies in the Park City watershed are being conducted under the direction of the UDERR, Mr. Muhammad Slam, and surface water is addressed within the regional study. By removal of mine tailings designated as MTB on Figures 7 and 8, from the stream channel within the Site boundaries, surface water quality will be improved.

Surface water pollution from mitigation activities will be prevented via a Storm Water Pollution Prevention Plan (SWP3) discussed in Section 4 of this document.

Storm water control for the proposed development is being addressed separately as part of the development plan. Storm water will follow PCMC Storm Water Management Plan ordinance.

3.7 MITIGATION OF SOILS

3.7.1 Natural Open Space South of Development

This section describes the mitigation plan for the natural open space south of the proposed development. This area includes the existing gravel road which accesses the PCMC water tank and reservoir, PCMC property, and the land designated as natural open space on Figure 3. The trails in this area are discussed in Section 3.7.3. In this non-residential area, soils with lead concentrations greater than 2,100 mg/kg are present as shown on Figures 7, 8, and 9. Mine tailings that have been identified (MTB) will be removed as discussed in Section 3.5.

As shown on Figure 9, from the area of disturbance at the proposed turn-around south to the city water line within the stream bed, soils with lead concentrations greater than 2,100 mg/kg are present. The soils with lead greater than 2,100 mg/kg will be removed and where removal is not feasible the soil will be capped. The cap will consist of 12 inches of soil, rip rap or combination of the two. The steep slope within Woodside Gulch will direct field decisions of removal or capping. The hillsides will be re-vegetated with native plants. Detailed plans of rehabilitation will be submitted to the DWR after review and initial approval of the development plans by the PCMC Planning Commission and approval of the Mitigation Work Plan. Mature evergreen trees on east side of the gulch will not be removed. All efforts will be made to remove soil with excessive lead concentrations and cap remaining soils with lead concentrations greater than 2,100 mg/kg in this area.

The area south of the city water pipeline is heavily vegetated with grasses and mature evergreen and aspens. Removal or capping of soils with concentrations greater than 2,100 mg/kg would require removal of the mature vegetation. Therefore, access to this area will be restricted through the use of a six-foot chain link fence. Within the restricted area flood deposits (FD) shown on Figures 7, 8, and 9, one sample KD2-3 at 12 inches below grade had a lead concentration of 29,875.2 mg/kg. The soil will be re-sampled at the surface at this location and analyzed for lead. If lead concentrations at the surface are above 8,000 mg/kg, the soil will be removed or capped dependent upon field conditions. Soil lead concentrations at the surface at AL-SS-21 and AL-SS-22 were 12,200 mg/kg and 9,050 mg/kg, respectively. If these locations are accessible the soil in these areas will be removed or capped if removal of mature vegetation and trees is not necessary.

Access will be restricted in the natural, open, non-residential area through the use of a six-foot tall, chain link fence. The gravel access road will have a locked gate restricting vehicle access excepting PCMC personnel and other authorized personnel. To restrict access from the gravel

road to the Woodside Gulch stream bed, a chain link fence will be placed on the east side of the gravel road, from the south Site property boundary to the locked gate on the access road. The fence will extend from the gravel road, follow the south side of the city water pipeline east to the PCMC chain link fence surrounding the reservoir. The steep slope on the west side naturally restricts access and a fence is not necessary. A chain link fence will be placed on the south property line of the Alice Lode Site from the gravel road east to the PCMC property boundary. Figure 10 shows the location of the fence. Figure 10 also shows the area south of the area of disturbance where lead concentrations greater than 2,100 mg/kg have been removed or capped.

Signs will be placed on the fence identifying the area as private property and access is not allowed. Responsibility for these controls will likely be the responsibility of the homeowners association and will be outlined in the Site Management Plan.

3.7.2 Residential Area

During construction of the proposed development, soils will be disturbed during construction of the building footprints, roads, driveways, and utility infrastructure. This disturbed area is referred to as the Area of Disturbance and is shown as a yellow line on Figures 7 and 8. Mitigation by removal of lead impacted soils with concentrations greater than 400 mg/kg will be completed in the area of disturbance.

Along the east Site property line, lead concentrations greater than 2,100 mg/kg and mine tailings are located outside the area of disturbance. The soils in this area will be mitigated by removal because the area is accessible, relatively flat, and near existing and proposed residences. On Figures 7 and 8, the area designated Area B has soil lead concentrations greater than 2,100 mg/kg outside the area of disturbance; lead impacted soil greater than 2,100 mg/kg in Area B will be mitigated by removal. Landscaped open areas are located in Areas A and B, which have soil lead concentrations greater than 400 mg/kg as shown on Figure 9. Until PCMC approves the final landscape plan, it is not known at this time the type of landscaping and the amount of disturbance. Because the soil lead concentrations above 2,100 mg/kg will be removed and the area is non-residential, the soil will be handled as non-residential.

The remaining areas shown on Figures 7 and 8 with soil lead concentrations greater than 400 mg/kg and outside of the area of disturbance will be mitigated by restricting access. Access will be restricted by the natural steepness of slope and a property deed restriction that would limit and control any future disturbances of the soil. This will be addressed in the Site Management Plan. Future disturbances may include, but are not limited to, future unplanned construction on the residential lot and landscaping. Figure 10 shows the mitigated areas and proposed development.

3.7.3 Roads and Trails

During mitigation and construction activities, the public use trails will be closed, and the gravel road will be closed except to authorized personnel. Recreational trail users will be re-routed at the south property boundary and the north property boundary prior to entry onto the Site.

To mitigate lead impacts on the gravel road, the road will be graded and resurfaced with appropriate gravel material. The grading and resurfacing of the road will follow PCMC road construction requirements and will be included in the development plans to the PCMC. The final surface of the road will be gravel and the top six inches of material will not have lead concentrations greater than 400 mg/kg. Upon completion of mitigation of the gravel road and other construction activities, recreational trail users will access the gravel road from the south property boundary from existing off-site trails and from the north property boundary from Ridge Avenue. The recreational trail (Daly access trail) located from the gravel road east will be resurfaced with six inches of appropriate gravel material and re-routed as shown on Figure 9. The recreational trails from the PCMC reservoir through Woodside Gulch will be closed and the trail will be re-routed to the gravel road as the slope is too steep to maintain the trail and the trail would cut through restricted areas. Trail routing is also subject to approval from the PCMC.

3.8 PUBLIC PARTICIPATION

A tabulated listing of public participation meetings held to date and planned for the immediate future on various aspects of the Alice Lode development is presented. Upon UDERR approval of the Mitigation Work Plan a public notice will be placed in the local newspaper, *The Park Record and The Salt Lake Tribune.* In addition, flyers will be delivered to residences near the Site. The public notice will allow a 30-day comment period and generally describe the Mitigation Work Plan. The Mitigation Work Plan will be available to the public and public meetings will be held as necessary.

Alice Lode
Public Meeting and Notice Schedule

Date	Place	Purpose
January 11, 2006	Park City	Park City Planning Commission work session.
July 2006	Park Record	Public Notice
To be announced	Park City	Park City Planning Commission

Additional meetings such as neighborhood meetings or Park City Planning Commission meetings will be scheduled as necessary. Park City Planning Commission meetings have public comment as part of the agenda. The following is the public notice that will be published.

PUBLIC NOTICE
DEPARTMENT OF ENVIRONMENTAL QUALITY
VOLUNTARY CLEANUP PROGRAM

The public is invited to comment on the cleanup of contaminated soil at the Alice Lode site located in the area of Woodside Gulch at the intersection of King Road and Ridge Avenue in Park City, Utah. King Development Group, LLC, represented by Jerry Fiat, will conduct cleanup under the Utah Department of Environmental Quality's Voluntary Cleanup Program.

Soils at the site have been impacted from historic mining operations. The remedy includes removal, capping, and restricting access to impacted soils while limiting removal of mature trees. The cleanup will remove and dispose off-site, mine tailings and soil with excessive lead concentrations. Soils in areas not accessible for removal will be capped. Access will be restricted in areas with excessive lead concentrations that are not accessible because of topography or because of excessive removal of mature trees and vegetation would be necessary.

Copies of the Mitigation Work Plan are available for review during normal business hours at the Utah Division of Environmental Response and Remediation (UDERR) offices, 168 North 1950 West, Salt Lake City, Utah 84116, and at Park City Municipal Corporation, Planning Office, 445 Marsac Avenue, 2nd Floor, Park City, Utah 84060. Please send your comments to Phillip Greer at the above UDERR address. For more information, contact Phillip Greer at 801-536-4246 or Jerry Fiat at 435-513-1273. The public is encouraged to comment on the plan through (*the date will be 30 days after it is placed in the paper*).

3.9 COORDINATION OF PUBLIC CONCERNS

Due to the nature of the work being undertaken and the location of the project Site within Park City, questions and concerns originating from residents and business owners in the general area may arise. Questions and concerns relating to construction and environmental issues will be referred to the Owner's Representative (the "Owner Representative" who has initially been designated as Mr. Jerry Fiat, at (435/513-1273)). A sign incorporating this information will be posted at the ingress and egress points of Alice Lode.

3.10 ROLES AND RESPONSIBILITIES

The following are personnel that have been identified for this Mitigation Work Plan. Other personnel will be identified as needed.

Property Owner
King Development Group, LLC
PO Box 4581
Park City, Utah 84060
Mr. Jerry Fiat, Owner's Representative

Property Owner and PCMC Environmental Coordinator
Park City Municipal Corporation (PCMC)
445 Marsac Avenue
Park City, Utah 84060
Mr. Ron Ivie, Building Inspector
Mr. Jeff Schoenbacher, Environmental Coordinator

Environmental Consultant
AMEC Earth & Environmental, Inc. (AMEC)
9865 South 500 West
Sandy, Utah 84070
Ms. Kathy Harris, Senior Project Manager

UDERR Project Manager
Utah Division of Environmental Response and Remediation (UDERR)
168 North 1950 West, 1st Floor
Salt Lake City, Utah 84114
Mr. Phillip Greer, Environmental Scientist

Mitigation Contractor
Geary Construction, Inc.
149 South Main Street
Coalville, Utah 84017
Ms. DeeAnn Geary

4.0 IMPLEMENTATION - ENVIRONMENTAL SOIL MITIGATION ACTIVITIES

4.1 SITE ACCESS

The Mitigation Contractor will be required to develop an access control plan and submit the plan to the Owner, Environmental Consultant, UDERR Project Manager, and the PCMC Environmental Coordinator for review and comment a minimum of two weeks prior to the anticipated start of mitigation activity.

The access control plan must assure strict access control to and from the Site is maintained at all times; that the mitigation boundaries of Alice Lode are to be fenced and designated points of ingress and egress are to be designated and controlled; and, that only equipment required as part of construction activities is to be permitted to enter the Site. The Site Access Plan will also address off-Site parking of the Mitigation Contractor's labor force and temporary staging of equipment and haul vehicles.

4.2 HEALTH AND SAFETY

The protection of human health and the environment is of major concern and importance during all phases of project work. The Owner's designated Mitigation Contractor has the full

responsibility for all aspects of health and safety on-Site and off-Site when and where remediation activities so impact. If the Owner's representative, the Owner's Environmental Consultant, or personnel of various regulatory agencies, while on-Site, observe conditions that warrant corrective action and report those conditions to the Mitigation Contractor, it becomes the Mitigation Contractor's sole responsibility to correct such conditions as they are reported. In the event that a situation arises that is an immediate threat to human health or the environment,

the Owner's representative, the Environmental Consultant, or the UDERR Project Manager may order an immediate halt to the work until corrective action has been implemented.

The Mitigation Contractor has the option to utilize the Site Health and Safety Plan (SHSP) found in Appendix A, or if the Mitigation Contractor prefers to utilize a different SHSP specific to this work. In such a case, the Mitigation Contractor's SHSP must address anticipated work conditions and potential contaminants and be no less stringent than the SHSP presented in this report. The SHSP must designate a Site Safety Officer by name and must detail the responsibilities for implementing and supervising the SHSP and for maintaining site control.

Two copies of the SHSP will be furnished to the Owner's representative a minimum of two weeks prior to the start of mitigation activities. The Owner's representative will furnish one copy to the UDERR Project Manager for the agency's use.

Multiple SHSPs may be developed depending on the protocol and requirements of each regulatory entity represented and/or working on-Site. Though multiple SHSPs may be on-Site, all SHSPs must be as stringent as the SHSP utilized by the Mitigation Contractor. The Mitigation

Contractor's SHSP will govern the health and safety aspects of the work on-Site. This does not preclude other business or government entities from implementing stricter requirements specific to their own employees.

4.3 GENERAL ACTIVITIES

This section outlines in general terms what is required of the Mitigation Contractor relative to environmental mitigation activities related to impacted soils and mine tailings situated within the Site's boundaries. Particular attention is directed towards efforts associated with the protection of human health and the environment. This section will assist in reducing exposure to contaminants by identifying and employing possible control measures during soil handling operations. Emphasis is also directed at the mitigation of cross-media contamination during construction activities.

All existing local, state, and federal regulations and guidance documents are to be followed by the Mitigation Contractor relative to the handling of contaminated media at this site.

Construction mitigation activities will be undertaken in the following general order:

1. Establish Site perimeter boundary of the residential/non-residential zones as delineated

on Figure 7 and 8. This is shown as the "Area of Disturbance" on Figures 7 and 8.

2. A SWP3 will be implemented for the duration of mitigation and construction activities within the Site boundaries. Included as Appendix B is a SWP3. The Mitigation Contractor is given the option to utilize the SWP3 found in Appendix B or to submit a different plan which is no less stringent than the plan in this report. The plan must be submitted for review and approval to the Owner's representative a minimum of two weeks prior to start of work. Prior to initiation of mitigation activities a Notice of Intent (NOI) will be obtained.
3. Implement the Fugitive Dust Control Plan, an example of which is shown in Appendix C. The Mitigation Contractor may use this plan or develop and submit a separate plan that is no less stringent than the plan in this report. The plan must be submitted to the Owner's representative a minimum of two weeks prior to the start of work.
4. Implement a temporary decontamination area for people and equipment leaving the Site as described in Section 4.3.3.
5. Mitigation
6. Work is to be scheduled and implemented such that work activities will progress from the south to the north in order to eliminate the chance of cross contamination occurring.
    a. Remove and Dispose (R&D) or cap upstream flood deposits designated as FD with concentrations greater than 10,000 mg/kg shown on Figures 7 and 8.
    b. R&D mine tailings and impacted soils above the 400 mg/kg action level for lead from area MTB.
    c. R&D or cover lead impacted soil above 2,100 mg/kg south of area of disturbance to the city water pipeline.
    d. R&D impacted soils above the 400 mg/kg action level for lead from areas A, B, C, and D within the area of disturbance as shown on Figures 7 and 8. Remove excess soils from tree roots, rocks and boulders prior to transporting and disposing of this debris off-site. Employ institutional controls (cover or restrict access) in areas A, B, C, and D outside the area of disturbance. Twelve-inches of topsoil will be placed and maintained in capped areas. The Mitigation Contractor is to certify that the imported topsoil has concentrations of lead below 400 mg/kg and arsenic below 100 mg/kg through testing by a Utah State Certified analytical laboratory. As discussed in Section 3.5, no areas have been designated as being capped, however, field conditions may warrant a change of institutional control. The UDERR will be notified prior to any changes.
    e. Areas E through M are not to be disturbed and institutional controls will be used to limit access to the area.
    f. Excavated clean soils proved suitable for roadway/trail surfacing may be used to surface the trails and the roadway within the area of disturbance.
    g. Paving operations are to proceed from the north to the south in order to prevent any cross contamination. Paving is only to be completed within the area of disturbance.
7. Construction (buildings, roads, utilities) can be undertaken simultaneously with remediation activities as long as cross contamination does not occur.

8. Access will be restricted through institutional controls to areas with lead concentrations above action levels and where R&D was not conducted.

The Mitigation Contractor is to provide the Owner's representative with a detailed schedule of mitigation and construction activities which clearly addresses the means, methods and timing of activities by which to assure against cross contamination.

4.3.1 Cross Media Transfer/Mitigation

The transfer of contaminants from on-Site soils to other media both on and off the Site is generally referred to as cross-media transfer. The Mitigation Contractor is to assure that cross-media contamination does not occur. It is the Mitigation Contractor's responsibility to prevent transfers of contaminants from the on-Site soils to air, water, and other natural media. Potential cross-media transfer may arise from the following:

- The inherent risk that the Site characterization has not identified all areas of high and low concentrations of contaminants of concern.
- Fugitive dust emissions during various on-Site activities including movement of equipment on-Site and the excavation, staging, hauling, and placement of soils.
- Leaching of contaminants to surface water from uncovered stockpiles and excavations.
- Improper handling of residues, such as silts collected in storm runoff catchment areas and generated from decontamination wash water which improper handling could allow contaminants to migrate and impact uncontaminated areas and surface waters.

In the event that a situation arises that is an immediate threat to human health or the environment, the Owner's representative, the Environmental Consultant, or the UDERR Project Manager may order an immediate halt to the work until corrective action has been implemented.

4.3.2 Site Preparation and Staging

Prior to moving equipment on the site and commencing soil operations, the Mitigation Contractor will undertake and complete the following activities:

- Stake the Site boundaries.
- Secure the site through fencing or other appropriate means.
- Implement Site access control with designated ingress and egress point(s) and controls.
- Identify and mark areas of impacted tailings and soils scheduled to be removed.
- Initiate the SWP3 and install engineering controls as stipulated in the plans. Identify surface drainage flow patterns and develop a surface runoff management plan to prevent contamination from flowing off-site.
- Identify and mark existing subsurface utilities through "Blue Stakes" and/or the appropriate public utility organization(s).

- Implement necessary air monitoring system.

4.3.3 Pre-Soil Disturbance Activities

Prior to the commencement of soil movement activities (clearing, grubbing, excavation, transporting, and placement), the following activities will be completed:

- The proposed means and methods of the decontamination of personnel and equipment are to be submitted to the Owner's representative, Environmental Consultant, and the UDERR Project Manager at least two weeks prior to the start of mitigation activities. In addition, a Site map and layout details of the decontamination area will be provided at the same time.
- The Environmental Consultant will notify UDERR of the commencement of soil removal activities at least one week prior to the actual start of mitigation work. The notification will be verbal.
- Implement site access control.
- Implement the SWP3 (see Appendix B). Off-Site runoff is to be prevented from entering and mixing with on-Site contaminated soils by the use of earthen berms or other field proven methods. On-Site surface runoff is to be captured by diversions to a controlled holding area. The runoff will be allowed to naturally evaporate. The sediment will be characterized and the sediment will be disposed of in the same manner as the site soils at the end of the project.
- Implement a temporary decontamination area for people and equipment leaving the site. At a minimum, this decontamination area is to be designed in such a manner as to collect wash water, soils, and other solid media generated during equipment decontamination. In addition, the decontamination area is to be provided with properly marked containers for the temporary storage of used personal protective equipment, such as clothes and shoe coverings.

4.3.4 Operational Considerations During Construction

During active soil remediation operations related to the disturbance of on-Site soils, the Mitigation Contractor shall:

- Monitor predicted and real-time weather conditions as those conditions would impact construction operations and cross media transfer as in the case of high wind conditions. Operations are to be adjusted accordingly. In this regard, the Mitigation Contractor is required to review past climatological records of the National Weather Service.
- Adjust the surface runoff mitigation and SWP3 plans and their field implementation as site conditions change during construction operations.
- Implement operational controls as Site conditions warrant.
- Maintain low vehicle speeds with all vehicles on unpaved driving areas.
- Control placement, size, and shape of soil piles. Place soil piles in areas were they are shielded from prevailing winds. Shape soil piles to minimize surface areas exposed to

winds. Employ wind screens where practical. Apply dust control measures, including coverings, to the soil piles as necessary. The Mitigation Contractor is to utilize the Air Monitoring Plan and procedure for controlling dust generated from the soil piles and the site in general while awaiting analytical results.

- Where practical, utilize larger equipment to minimize surface area/volume ratio of soils being excavated.
- When transporting soils off-Site, cover or enclose all loads. Observe all trucks leaving the Site for spillage. Take immediate corrective action when spillage or potential for spillage is observed.
- Utilize appropriate covers over stockpiles and excavations as conditions warrant.
- Apply water spray, with or without additives, during excavation, loading, and dumping operations, and to disturbed areas in general as site conditions warrant.
- Apply dust suppressants as Site conditions warrant.

4.3.5 Site Monitoring

Personnel

Individual personal air monitoring is to be undertaken in conformance with any applicable requirements of the SHSP. It is the Mitigation Contractor's responsibility to assure compliance with the provisions of the SHSP relative to personal air monitoring. Documentation of the analytical results is to be furnished to the Owner's representative and the Environmental Consultant in a timely manner.

Air and Dust Monitoring

Air monitoring will be conducted in accordance with the approved Fugitive Dust Control Plan.

Air monitoring will be dependent on daily weather conditions and adjusted in consultation with the UDERR Project Manager and the Environmental Consultant. The Mitigation Contractor shall maintain a daily log recording the location of the system, wind speed, wind direction, time of sample collection, chain of custody identification number, and the name of the sampler.

The type of air monitoring system to be employed at the Site is left to the Mitigation Contractor's discretion. The air monitoring system must be able to meet the above stated objectives. Prior to the commencement of any Site work, an ambient air sample is to be collected. This sample event is to form a base by which samples that may be collected during construction activities will be compared. Additional up-wind samples may be required during construction activities.

Soils

On-Site soils will be monitored by the Environmental Consultant on behalf of the Owner. The Mitigation Contractor is to coordinate its' operations so that adequate soil sampling can be completed. This coordination shall include, as a minimum: providing a schedule of proposed excavation and placement activities seventy-two (72) hours prior to those activities taking place; adjusting the rate of its operations to accommodate reasonable needs for testing; and stockpiling and identifying soils so that test results can be coordinated.

5.0 DISPOSAL FACILITIES

Solid media removed from the Site will be disposed of at an appropriate facility. Debris, such as vegetation and acceptable soils may be disposed at a local non-hazardous waste landfill within reasonable haul distance from the site. Soils adhering to debris will be carefully removed by mechanical means such as brushing. This work will be undertaken in a manner consistent with safe operating procedures. Some materials, particularly excavated soils with lead concentrations above established action levels, will require disposal at a regulated waste landfill. Richardson Flats Repository has agreed to accept the waste material.

The Mitigation Contractor will identify the disposal location for non-hazardous waste disposal. The UDERR Project Manager will be notified of the selected location. It is the Mitigation Contractor's responsibility to ascertain the required documentation for delivering and disposing of materials at the non-hazardous waste disposal facilities and provide the completed documentation to the Owner's representative and the Environmental Consultant.

5.1 COORDINATION OF DISPOSAL ACTIVITIES

The Mitigation Contractor is responsible for the coordination of all activities relative to the movement of debris off-Site for disposal purposes. The Mitigation Contractor will provide the UDERR Project Manager, and the Environmental Consultant with a written schedule of planned operations at the start of work and will update the schedule in a timely manner as site conditions warrant. The Environmental Consultant will collect soil samples during excavation activities as discussed in further detail in Section 6.0. This data will be continually reviewed and the Environmental Consultant will notify the Mitigation Contractor, the UDERR Project Manager, and the Owner's representative immediately if any problems should develop within the laboratory or with field meters, which would adversely impact the construction schedule.

5.2 OFF-SITE TRANSPORTATION

Off-Site transportation of debris will be in complete conformance with all local, state, and federal rules, regulations, and laws. The Mitigation Contractor is responsible for the movement of soils both on and off the Site.

5.3 DOCUMENTATION

The Mitigation Contractor is responsible for the complete coordination and timely preparation of all documentation required by the receiving facility for any debris removed to an off-site facility.

6.0 MITIGATION AND VERIFICATION ANALYTICAL SAMPLING

The Owner anticipates that soils will be sampled and analyzed during mitigation activities using either field instrumentation and/or laboratory analysis of samples collected in the field. The Environmental Consultant shall conduct such testing.

6.1 SAMPLING ANALYSIS PROJECT PLAN (SAPP)

A SAPP/QAP for this Site was previously submitted and approved by the UDERR. A new QAP will not be submitted as mitigation soil sampling methods will follow protocol presented in the previously approved QAP. Section 6.1 is the Sampling Analysis Project Plan (SAPP) for Site mitigation including the Sampling Work Plan, Field Instruments, and Quality Control.

6.1.1 Sampling Work Plan

It is the intent of this Mitigation Work Plan to remove and potentially cover soils impacted by lead above the established action levels as described in previous sections. An X-ray florescence (XRF) will be used to determine at which point excavation will cease. The XRF will be used to screen lead concentration and laboratory confirmation samples will determine if mitigation is complete.

XRF screening will occur every 50 feet to evaluate lead concentrations. To confirm mitigation is complete, a grab sample will be collected every 50 feet and four grab samples will be composited for submittal to the laboratory. Approximately 30 confirmation grab samples (approximately 10 composite samples) will be collected in FD, MTB, and the non-residential development section within the area of disturbance. The mine tailings are estimated to be up to 5 feet thick in some areas.

In the areas of proposed residential development, the XRF will be used to screen soil samples. Grab samples will be collected every 50 feet and four grab samples will be composited for submittal to the laboratory to confirm lead concentrations. The estimated number of confirmation grab samples to be collected is approximately 30 samples and approximately 10 composite samples will be submitted to the laboratory. Samples will be collected approximately every 50 feet in areas identified in the SARR as having lead concentrations above 400 mg/kg.

Soil with lead concentrations greater than 400 mg/kg but less than 2,100 mg/kg may be placed beneath roadways and paved areas. The concentration of the soils placed beneath the roadways and paved parking areas will be sufficiently characterized using XRF instrumentation and laboratory analysis to assure that sufficient information is available to prepare the Site Mitigation Plan. Random XRF instrument readings will be taken at one-foot lifts and laboratory analysis will be undertaken at a ratio of one laboratory sample per every 20 XRF readings.

The following quality control samples will be collected:

- To confirm XRF readings, 5 percent of the samples will be analyzed by a Utah-certified laboratory for analysis of total concentration of lead and arsenic using EPA Method

6010B. Analysis using the Toxic Characteristic Leaching Procedure (TCLP) will not be undertaken.

- A trip blank will be sent for analysis at a ratio of 1 trip blank per 20 samples analyzed.
- Equipment blanks, if equipment decontamination is necessary, will be collected at one equipment blank per day.
- Duplicate split samples will be collected as a measure of the field and laboratory QA/QC. The UDERR Project Manager may be collecting split samples during the sampling operations.

TABLE 1 - SAMPLE ANALYSES FOR LEAD AND ARSENIC IMPACTED SOIL
ALICE LODE
PARK CITY, UTAH

Sample Number	Sample Type	Location	Rationale	Analytical Parameters	
				Pb/As XRF	Pb/As Laboratory
1-30	Soil	MTB, Non-residential	Screening	X	
31-41	Soil	FD, MTB, Non-residential	Confirmation		X
42-72	Soil	Residential development	Screening	X	
73-83	Soil	Residential development	Confirmation		X
83-87	Soil	Non-residential and Residential	Laboratory confirmation		X
88-90	Soil	Quality Control	Duplicate/Split	X	X
91-101	Soil	Quality Control	Equipment Blank		X
102-105	Water	Quality Control	Trip Blank		X

- Pb – Lead.
- As - Arsenic.
- Sample Identifications will be designated as KD3-XX, depth.
- American West Analytical Laboratories of Salt Lake City, Utah will be the designated Utah State Certified laboratory.
- Analysis for total lead and arsenic using EPA Method 6010B.

6.1.2 Field Instrumentation for Field Screening of Soils

Field screening of soils will be undertaken with an XRF instrument during soil excavation for the sole purpose of expediting the excavation and disposal at the appropriate disposal facility. Field screening is not to be construed as a substitute for chemical analysis. The results obtained from chemical analysis will be the sole basis by which disposal decisions and final characterization will be determined.

The XRF will be calibrated at the beginning of each workday in conformance with the manufacture's instruction.

6.2 QUALITY ASSURANCE/QUALITY CONTROL

Sampling will proceed according to the methods described in the approved QAPP. The only exception to the procedures detailed in the QAPP is that a Level III QA/QC reporting package will be requested from the analytical laboratory. This will include a case narrative, laboratory control sample, matrix spike/matrix spike duplicate (MS/MSD) sample, and method blanks. Quality control samples of equipment blanks, trip blanks, and duplicates will be collected as previously described and shown on Table 1. In addition, field screening with the XRF instrument will be in complete conformance with the manufacturer's instructions.

A standard turnaround time will be requested from the laboratory for the initial characterization samples. A 24-hour turnaround time will be requested from the laboratory for the final confirmation and UDERR split samples.

Analytical samples to be sent to a certified laboratory for analysis will be collected using disposable equipment. Field decontamination of sampling equipment is not anticipated. All disposable sampling equipment and personal protective equipment will be cleaned, bagged, removed from the area, and properly disposed of as non-hazardous material.

7.0 FINAL REPORT

The Environmental Consultant will prepare a final report. This report will encompass as-built drawings, field reports and logs, chain-of-custody forms, analytical results, manifests, permits, institutional controls, and other documentation as appropriate. This report will be furnished within a reasonable period of time after all construction operations associated with the remedial operations are accomplished. As-built drawings are to be furnished by the Contractor. The Site Management Plan will be prepared upon completion of the final report and will not be part of the final report.

8.0 SCHEDULE OF ACTIVITIES

KDG anticipates initiation of this work using the following schedule:

Design and Bid Period

Alice Lode — Ongoing – Completion estimated July 2006.

Field Activities

Alice Lode — September 2006 – actual time frame dependant on approval of the submitted Mitigation Work Plan.

Final Report to DERR

Alice Lode — Time frame will depend on the extent of activities as described in the Work Plan. A time frame cannot be estimated at this time.

This report was prepared by AMEC Earth & Environmental, Inc.

Date: 8/3/2006

Robyn Kurz
Project Geologist

Reviewed by:

Date: 8/3/06

Kathy M. Harris, PG
Senior Project Manager

TAB #12

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 1
4-Jun-00

Work this period includes Mobilization, Hazardous and non-hazardous material removal, building excavation, Structure A and B excavation and concrete, and grading in SR 224. Costs for Hazardous Waste Remediation have been segregated. Disposal of unsuitable materials as Haz waste costs $157 / ton while non haz materials cost $36/ton. The Line item 032 has been distributed based upon the proportion 36/157 as non hazardous and (157-36)/157 as hazardous.

Original Contract Amount			$ 5,736,000
Approved Change Orders			$ -
Current Contract Amount			$ 5,736,000

Work To Date	Non FTA	FTA	
Haz Waste	$ 202,603.19	$ 60,278.63	$ 262,881.82
Non Haz Waste		$ 14,512.32	$ 14,512.32
Other Work		$ 356,714.00	$ 356,714.00
Total Work to date	$ 202,603.19	$ 431,504.95	$ 634,108.14
Minus retention @ 5%			$ 31,705.41
Payable			$ 602,402.73
Previous Payments			$ -
This estimate # 1			$ 602,402.73

check $	262,881.82	
check $	14,512.32	
check $	356,714.00	

Summary of Payments

	This request	To date
#1	$ 602,402.73	$ 602,402.73

I find the amount requested represents the work progress.

Amount due now	**$ 602,402.73**

John D. Chmelir PE

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 2
12-Jul-00

Work this period includes Removal of hazardous and non-hazardous soils, excavation ion the site for construction of the road and s demolition and construction of the west-side of SR 224, building foundation and east-side walls, structure A and B, and electrical wo lowering of the power lines.

My recommendation for payment differs from that requested because the total of the Hazardous Waste Disposal Certificates does r the quantity in the HH request. I have agreed to 1688 tons. Documentation is attached.

Concerning Non-Hazardous Waste, HH has submitted tally tickets for 507.68 tons of material hauled off but is requesting payment tons at this time. The 10.8 ton balance will be requested on the next pay estimate at the agreed change order price of $18.23 / ton. is attached.

Original Contract Amount			$ 5,736,000
Approved Change Orders			$ -
Current Contract Amount			$ 5,736,000

Work To Date	Non FTA	FTA	
Haz Waste haul-off	$ 406,854.82	$ 121,047.71	$ 527,902.53
Non Haz Waste haul-off		$ 32,400.00	$ 32,400.00
Other Work		$ 839,675.00	$ 839,675.00
Total Work to date	$ 406,854.82	$ 993,122.71	$ 1,399,977.53
Minus retention @ 5%			$ 69,998.88
Payable			$ 1,329,978.65
Previous Payments			$ (602,402.73)
This estimate # 2			$ 727,575.92

check	$	527,902.53
check	$	32,400.00
check	$	839,675.00
check	$	1,399,977.53

Summary of Payments

	This request	To date
#1	$ 602,402.73	$ 602,402.73
#2	$ 727,575.92	$ 1,329,978.65

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$ 727,575.92**

John D. Chmelir PE

Old Town Transit Center **26-Jul-00**
Park City Municipal Corporation
Park City , UT

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 3 To July 14, 2000

Work this period includes Removal of non-hazardous soils, excavation on the site for construction of the road and structures, completion of the west-side of SR 224 demolition and earthwork on the east side of SR 224, building west-side walls and partial backfill, structure E complete, excavation for structure B and H, stone masonry on Wall E including payment for materials stored. and electrical work related to the lowering of the power lines.

My recommendation for payment differs from that requested because the total of the Hazardous Waste Disposal Certificates does not square with the quantity in the HH request. I have agreed to a total to date of 3561.73 tons. Documentation is attached.

The recommendation includes payment for haul-off of excess material in the amount of 217 tons to the truck ramp and 389.79 tons to Three-Mile Canyon at pricing previously agreed to. The recommendation also includes payment of the West Side Completion Bonus of $25,000. A formal change order is being processed for both.

Original Contract Amount				$ 5,736,000
Approved Change Orders		Negotiated Only	$ 152,115	$ -
Current Contract Amount				$ 5,736,000
Work To Date		Non FTA	FTA	
Haz Waste haul-off		$ 430,969.33	$ 128,222.28	$ 559,191.61
Non Haz Waste haul-off			$ 32,400.00	$ 32,400.00
Other Work			$ 1,606,839.33	$ 1,606,839.33
Total Work to date		$ 430,969.33	$ 1,767,461.61	$ 2,198,430.94
Minus retention @	5%			$ 109,921.55
Payable				$ 2,088,509.39
Previous Payments				$ (1,329,978.65)
This estimate #	3			$ 758,530.74

Summary of Payments

	This request	To date	Remaining
#1	$ 602,402.73	$ 602,402.73	$ 5,133,597.27
#2	$ 727,575.92	$ 1,329,978.65	$ 4,406,021.35
#3	$ 758,530.74	$ 2,088,509.39	$ 3,647,490.61

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$ 758,530.74**

John D. Chmelir PE

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 4 To August 14, 2000

Work this period includes Removal of non-hazardous soils, excavation on the site for construction of the road and structures, completion on the east side of SR 224, Construction on Structures F, H, D, and B, Stone Masonry on Structures C, E, D, and H including payment for stored, Completion of the building foundation and slabs, underslab rough-in, and electrical work related to the lowering of the power lines.

Certain items (Prop 1,2,4,5,8 and DIR 99 have been negotiated but await a formal change-order. Since agreement has been achieved, it the construction industry to make payment for these items while paperwork is completed.

Original Contract Amount				$ 5,736,000
Approved Change Orders	#1		$ 131,915	$ 131,915
	Negotiated Only		$ 267,337	$ -
Current Contract Amount			$ 96,527	$ 5,867,915
Work To Date	Non FTA		FTA	
Haz Waste haul-off	$ 460,598.45		$ 137,037.55	$ 597,636.00
Non Haz Waste haul-off			$ 32,400.00	$ 32,400.00
Other Work			$ 2,241,086.50	$ 2,241,086.50
Total Work to date	$ 460,598.45		$ 2,410,524.05	$ 2,871,122.50
Minus retention @	5%			$ 143,556.13
Payable				$ 2,727,566.38
Previous Payments				$ (2,088,509.39)
This estimate #	4			$ 639,056.99

Summary of Payments

	This request	To date
#1	$ 602,402.73	$ 602,402.73
#2	$ 727,575.92	$ 1,329,978.65
#3	$ 758,530.74	$ 2,088,509.39
#4	$ 639,056.99	$ 2,727,566.38

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now $ 639,056.99

Old Town Transit Center **17-Nov-00**

Park City Municipal Corporation

Park City , UT

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 7 To October 14, 2000

Work this period includes Removal of non-hazardous soils, excavation on the site for construction of the Transit Road and structures, Final grading and p the Transit Road, excavation and grading for the Historic Wall PArking Lot, work on punchlist items for the roundabout and Flagpole Parking Lot, constru Structures, I, J, and K, Stone Masonry on Structures F, H, I, J, K, including payment for materials stored, Installation of 3 timber trusses and framing in th

CO #s 1 & 2 have been negotiated and signed. CO#1 are unit price items and have experienced significant overages. The work on those items we belie complete on this Pay Estimate #7, although addititonal truck tickets could still arrive. . The unit price for DIR-99 has been negotiated, and will be includec CO#3. It is customary to pay items that have been negotiated while waiting for formal change order.

This estimate includes the $18,000 East side partial completion incentive. It should be noted that there are minor discrepancies in the total quantitie material haul-off, and final negotiation on the amount of bulking remains. In the interim, I believe the amounts estimated to be very close to an accurate a accounting, which final accounting hopefully will accompany next month's pay request recommendation.

Original Contract Amount				$ 5,736,000
Approved Change Orders	#1,2	$	234,200	$ 234,200
	Negotiated Only	$	9,025	$ -
Current Contract Amount		$	243,225	$ 5,970,200
Work To Date	Non FTA	FTA		
Haz Waste haul-off	$ 460,598.45	$	137,037.55	$ 597,636.00
Non Haz Waste haul-off		$	32,400.00	$ 32,400.00
Other Work		$	4,404,077.62	$ 4,404,077.62
Total Work to date	$ 460,598.45	$	4,573,515.17	$ 5,034,113.62
Minus retention @ 5%				$ 251,705.68
Payable				$ 4,782,407.94
Previous Payments				$ (4,452,369.42)
This estimate # 7				$ 330,038.52

Summary of Payments

	This request	To date	Remaining
#1	$ 602,402.73	$ 602,402.73	$ 5,367,797.27
#2	$ 727,575.92	$ 1,329,978.65	$ 4,640,221.35
#3	$ 758,530.74	$ 2,088,509.39	$ 3,881,690.61
#4	$ 639,056.99	$ 2,727,566.38	$ 3,242,633.62
#5	$ 1,001,318.72	$ 3,728,885.10	$ 2,241,314.90
#6	$ 723,484.32	$ 4,452,369.42	$ 1,517,830.58
#7	$ 330,038.52	$ 4,782,407.94	$ 1,187,792.06

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now **$ 330,038.52**

Old Town Transit Center **15-Mar-01**

TO: Mark Christiansen **Park City Municipal Corporation**
FROM: John Chmelir **Park City , UT**
RE: Pay Request # 10 To February 14, 2001

Work this period includes Stone Masonry construction on Structures, I, J, and K, topsoil cap, framing canopies and building, elevator installation, doors and winddows, roofing and siding, painting, building stonework and veneer, plumbing, fire protection, HVAC, electrical work in the building, and includes payment materials stored.

CO #s 1, 2, 3, 4, 5,& 6 have been negotiated and signed. CO#1 are unit price items and have experienced significant overages. The work on those items to be complete, although additional truck tickets could still arrive. We have conducted field measurements and are in final reconcilliation of quantities and negotiations of haul off dirt quantities.

We have setled the quantities for Roto Mill Asphalt and are close to settling the qunatities for material haul-off. I expect that this issue will be finally settled Request #11.

Original Contract Amount				$ 5,736,000
Approved Change Orders	# 1,2,3,4,5,6	$	596,766	$ 596,766
Current Contract Amount		$	596,766	$ 6,332,766
	Payable			
				$ 6,332,766
Work To Date	Non FTA	FTA		
Haz Waste haul-off	$ 460,598.45	$	137,037.55	$ 597,636.00
Non Haz Waste haul-off		$	32,400.00	$ 32,400.00
Other Work		$	5,696,772.00	$ 5,696,772.00
Total Work to date	$ 460,598.45	$	5,866,209.55	$ 6,326,808.00
Minus retention @ 5%				$ 316,340.40
Payable				$ 6,010,467.60
Previous Payments				$ (5,692,789.64)
This estimate # 10				$ 317,677.96

Summary of Payments

	This request	To date	Remaining
#1	$ 602,402.73	$ 602,402.73	$ 5,730,363.27
#2	$ 727,575.92	$ 1,329,978.65	$ 5,002,787.35
#3	$ 758,530.74	$ 2,088,509.39	$ 4,244,256.61
#4	$ 639,056.99	$ 2,727,566.38	$ 3,605,199.62
#5	$ 1,001,318.72	$ 3,728,885.10	$ 2,603,880.90
#6	$ 723,484.32	$ 4,452,369.42	$ 1,880,396.58
#7	$ 330,038.52	$ 4,782,407.94	$ 1,550,358.06
#8	$ 470,731.31	$ 5,253,139.25	$ 1,079,626.75
#9	$ 439,650.39	$ 5,692,789.64	$ 639,976.36
#10	$ 317,677.96	$ 6,010,467.60	$ 322,298.40

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now $ 317,677.96

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 12 To June 14, 2001

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

Work this period includes: Punchlist items; paving of the historic parking lot and plant-mix seal coat on the Transit Road; topsoil cap; lands

CO #s 1, 2, 3, 4, 5,6, & 7 have been negotiated and signed. CO#1 include unit price items that have experienced significant overages. Th complete, although additional truck tickets could still arrive. We have conducted field measurements and are not in agreement as to final c

HHSI has requested a reduction of retainage but is unwilling to submit final release of future claims. PCMC is obligated to retain 89 days L $133,500 (12/15/00 - 3/14/01), plus enough $ to ensure completion of punchlist items = $50,000, for a total of $183,500 required retention.

Original Contract Amount				$	5,736,000
Approved Change Orders	# 1,2,3,4,5,6&7		$ 658,215	$	658,215
Current Contract Amount			$ 657,220	$	6,394,215
	Payable				
				$	6,394,215
Work To Date	Non FTA		FTA		
Haz Waste haul-off	$	460,598.45	$ 137,037.55	$	597,636.00
Non Haz Waste haul-off			$ 32,400.00	$	32,400.00
Other Work			$ 5,961,473.39	$	5,961,473.39
Total Work to date	$	460,598.45	$ 6,130,910.94	$	6,591,509.39
Minus retention @ REQUIRED				$	183,500.00
Payable				$	6,408,009.39
AVAILABLE	**Contr Amt - Req'd Retainage**			**$**	**6,210,715.00**
Previous Payments				$	(6,094,616.00)
This estimate # 12				$	116,099.00

Summary o

	This request
#1	$ 602,402.73
#2	$ 727,575.92
#3	$ 758,530.74
#4	$ 639,056.99
#5	$ 1,001,318.72
#6	$ 723,484.32
#7	$ 330,038.52
#8	$ 470,731.31
#9	$ 439,650.39
#10	$ 317,677.96
#11	$ 84,148.40
#12	$ 116,099.00

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$**	**116,099.00**

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 13 To July 14, 2001

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

Work this period includes: Punchlist items, landscaping, and Warranty Work.

CO #s 1, 2, 3, 4, 5,6, 7 & 8 have been negotiated and signed. CO#1 include unit price items that have experienced significant overages. T complete. We have conducted field measurements and are not in agreement as to final quantities. Hughes has indicated that it feels the u negotiation on 8/15, but necessary budget has not yet been agreed to or included in the contract. Much of that work was provisionally paid additional work that is part of the of the original contract. Because the disputed work has been previously paid, no contract funds remain tc

HHSI has requested a reduction of retainage but is unwilling to submit final release of future claims. PCMC is obligated to retain 89 days L $133,500 (12/15/00 - 3/14/01), plus enough $ to ensure completion of punchlist items = $50,000, for a total of $183,500 required retention.

Original Contract Amount				$ 5,736,000	
Approved Change Orders	# 1,2,3,4,5,6&7		$ 691,835	$ 691,835	
Current Contract Amount			$ 657,220	$ 6,427,835	
				$ 6,427,835	
Work To Date	Non FTA		FTA		
Haz Waste haul-off	$	460,598.45	$ 137,037.55	$ 597,636.00	
Non Haz Waste haul-off			$ 32,400.00	$ 32,400.00	
Other Work			$ 6,012,630.39	$ 6,012,630.39	
Total Work to date	$	460,598.45	$ 6,182,067.94	$ 6,642,666.39	
Minus retention @ REQUIRED				$ 183,500.00	
Payable				$ 6,459,166.39	
AVAILABLE	**Contr Amt - Req'd Retainage**			**$ 6,244,335.00**	
Previous Payments				$ (6,210,715.00)	
This estimate # 13				$ 33,620.00	

Summary o

	This request
#1	$ 602,402.73
#2	$ 727,575.92
#3	$ 758,530.74
#4	$ 639,056.99
#5	$ 1,001,318.72
#6	$ 723,484.32
#7	$ 330,038.52
#8	$ 470,731.31
#9	$ 439,650.39
#10	$ 317,677.96
#11	$ 84,148.40
#12	$ 116,099.00

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$**	**33,620.00**

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # **14** Thru 9/30/01

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

Work this period includes: Punchlist items, landscaping, and Warranty Work.

CO #s 1, 2, 3, 4, 5,6, 7, 8 & 9 have been negotiated and signed. CO#1 include unit price items that have experienced significant overages. Tl measurements and are not in agreement as to final quantities. Hughes has indicated that it feels the unit pricing incorrect. The negotiation on necessary budget has not yet been agreed to or included in the contract. Much of that work was provisionally paid during the project. HHSI nc contract. Because the disputed work has been previously paid, no contract funds remain to fund this work.

PCMC is obligated to retain 89 days Liquidated Damages @ $1,500 / day = $133,500 (12/15/00 - 3/14/01), plus enough $ to ensure completior retention.

Original Contract Amount					$ 5,736,000	
Approved Change Orders		# 1,2,3,4,5,6, 7,8, & 9		$ 748,159	$ 748,159	#1
Current Contract Amount					$ 6,484,159	#2
						#3
					$ 6,484,159	#4
Work To Date		Non FTA		FTA		#5
Haz Waste haul-off		$	460,598.45	$ 137,037.55	$ 597,636.00	#6
Non Haz Waste haul-off				$ 32,400.00	$ 32,400.00	#7
Other Work				$ 5,854,123.00	$ 5,854,123.00	#8
Total Work to date		$	460,598.45	$ 6,023,560.55	$ 6,484,159.00	#9
Minus retention @	REQUIRED				$ 137,200.00	#10
	Payable				$ 6,346,959.00	#11
	AVAILABLE	**Contr Amt - Req'd Retainage**			**$ 6,346,959.00**	#12
Previous Payments					$ (6,300,659.00)	#13
This estimate #	14				$ 46,300	#14
						#15

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$ 46,300.00**

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # 14 To August 14, 2001

Work this period includes: Punchlist items, landscaping, and Warranty Work.

CO #s 1, 2, 3, 4, 5,6, 7, 8 & 9 have been negotiated and signed. CO#1 include unit price items that have experienced significant overages have conducted field measurements and are not in agreement as to final quantities. Hughes has indicated that it feels the unit pricing inco and the disagreement still stands, and necessary budget has not yet been agreed to or included in the contract. Much of that work was prc presents additional work that is part of the of the original contract. Because the disputed work has been previously paid, no contract funds

PCMC is obligated to retain 89 days Liquidated Damages @ $1,500 / day = $133,500 (12/15/00 - 3/14/01), plus enough $ to ensure compl of $183,500 required retention.

Original Contract Amount				$ 5,736,000
Approved Change Orders	# 1,2,3,4,5,6&7		$ 748,159	$ 748,159
Current Contract Amount				$ 6,484,159
				$ 6,484,159
Work To Date	Non FTA		FTA	
Haz Waste haul-off	$	460,598.45	$ 137,037.55	$ 597,636.00
Non Haz Waste haul-off			$ 32,400.00	$ 32,400.00
Other Work			$ 5,854,123.00	$ 5,854,123.00
Total Work to date	$	460,598.45	$ 6,023,560.55	$ 6,484,159.00
Minus retention @ REQUIRED				$ 183,500.00
Payable				$ 6,300,659.00
AVAILABLE	**Contr Amt - Req'd Retainage**			**$ 6,300,659.00**
Previous Payments				$ (6,244,335.00)
This estimate # 14				$ 56,324.00

Summary o	This request
#1	$ 602,402.73
#2	$ 727,575.92
#3	$ 758,530.74
#4	$ 639,056.99
#5	$ 1,001,318.72
#6	$ 723,484.32
#7	$ 330,038.52
#8	$ 470,731.31
#9	$ 439,650.39
#10	$ 317,677.96
#11	$ 84,148.40
#12	$ 116,099.00
#13	$ 33,620.00

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$**	**56,324.00**

TO: Mark Christiansen
FROM: John Chmelir
RE: Pay Request # **15** Thru 9/30/01

Old Town Transit Center
Park City Municipal Corporation
Park City , UT

Work this period includes: Punchlist items, landscaping, and Warranty Work.

CO #s 1, 2, 3, 4, 5,6, 7, 8 & 9 have been negotiated and signed. CO#1 include unit price items that have experienced significant overages. The work · field measurements and are not in agreement as to final quantities. Hughes has indicated that it feels the unit pricing incorrect. The negotiation on 8/1 stands, and necessary budget has not yet been agreed to or included in the contract. Much of that work was provisionally paid during the project. HH: of the original contract. Because the disputed work has been previously paid, no contract funds remain to fund this work.

PCMC is obligated to retain 89 days Liquidated Damages @ $1,500 / day = $133,500 (12/15/00 - 3/14/01), plus enough $ to ensure completion of punc required retention.

Original Contract Amount					$ 5,736,000			Summary o	
Approved Change Orders	# 1,2,3,4,5,6, 7,8, & 9		$ 748,159	$ 748,159				This request	
Current Contract Amount				$ 6,484,159		#1	$	602,402.73	
						#2	$	727,575.92	
						#3	$	758,530.74	
				$ 6,484,159		#4	$	639,056.99	
Work To Date	Non FTA		FTA			#5	$	1,001,318.72	
Haz Waste haul-off	$	460,598.45	$ 137,037.55	$ 597,636.00		#6	$	723,484.32	
Non Haz Waste haul-off			$ 32,400.00	$ 32,400.00		#7	$	330,038.52	
Other Work			$ 5,854,123.00	$ 5,854,123.00		#8	$	470,731.31	
Total Work to date	$	460,598.45	$ 6,023,560.55	$ 6,484,159.00		#9	$	439,650.39	
Minus retention @ REQUIRED				$ 137,200.00		#10	$	317,677.96	
Payable				$ 6,346,959.00		#11	$	84,148.40	
AVAILABLE	**Contr Amt - Req'd Retainage**			**$ 6,346,959.00**		#12	$	116,099.00	
Previous Payments				$ (6,300,659.00)		#13	$	33,620.00	
This estimate # 15				$ 46,300		#14	$	56,324.00	
						#15	$	46,300.00	

I find the amount requested and adjusted per comments above fairly represents the work progress.

Amount due now	**$ 46,300.00**

John D. Chmelir PE

COR # 24 #######

Analysis of Truck Count

Truck Count is 21 trucks low for grand total, but that works in HHSI interest.

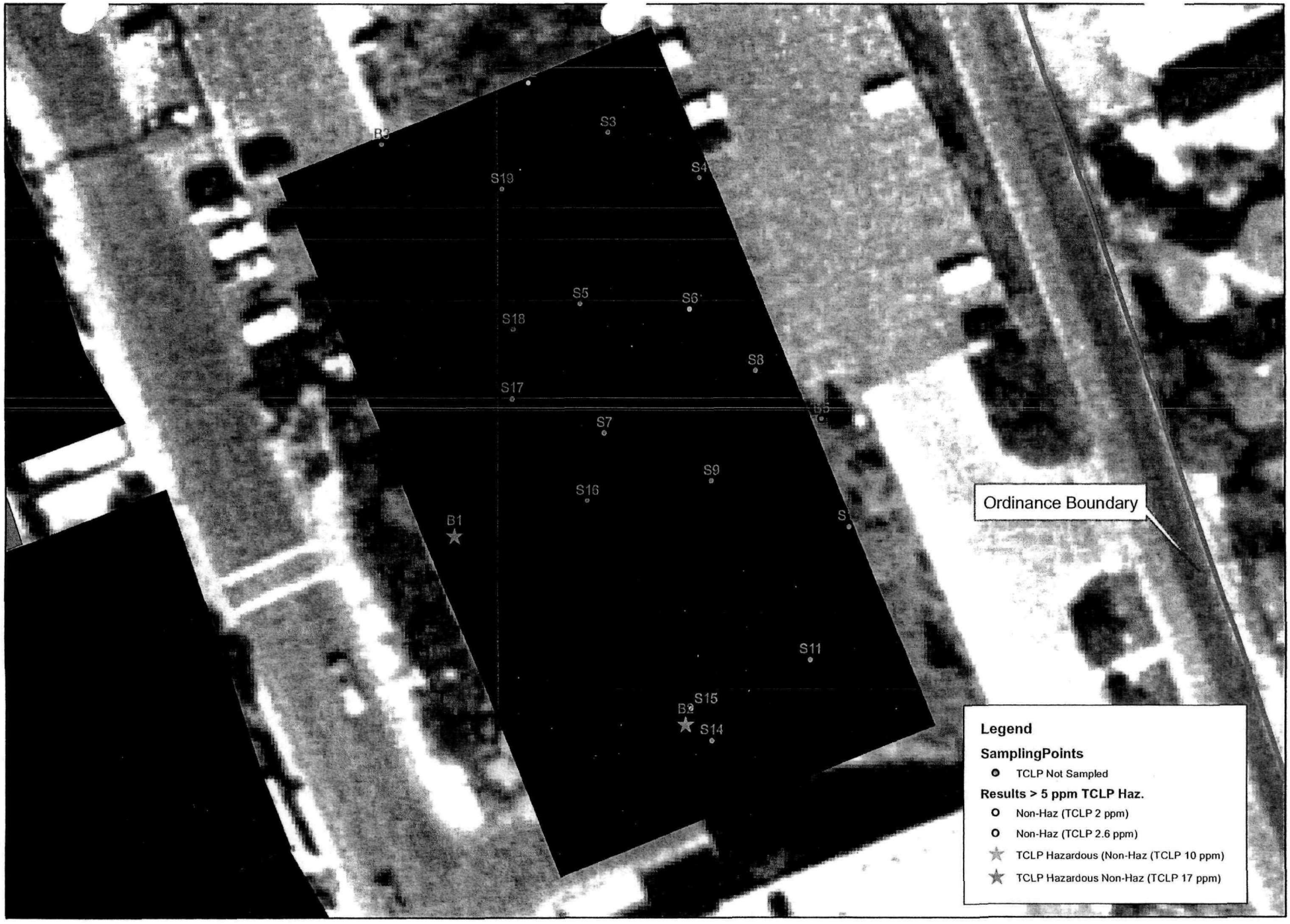
date	#8 3 ml	#7 Grd	#7 3 ml	#6 3 ml	#6 Trk	#5 Trail	#5 Chp	#5 Trk	#4 Trail	#4 Chp	#4 Trk	#3	TTL	# day	ttl>10	Day >10
6-Jul								15				28	43	1	43	1
7-Jul								16					16	2	16	1
8-Jul												58	58	4	58	1
9-Jul								46					46	5	46	1
11-Jul							42	3			4	29	78	6	78	1
12-Jul											23	23	46	7	46	1
13-Jul											38	47	85	8	85	1
14-Jul								87			7		94	9	94	1
15-Jul												32	32	10	32	1
17-Jul								40			40		80	11	80	1
18-Jul								4			52		56	12	56	1
19-Jul											40		40	13	40	1
1-Aug											2		2	14	0	0
2-Aug									14		33		47	15	47	1
3-Aug									25	33	78		136	16	136	1
8-Aug										6	40		46	17	46	1
9-Aug									8	5	34		47	18	47	1
10-Aug										9	31		40	19	40	1
11-Aug						9			3				12	20	12	1
14-Aug										1	33		34	21	34	1
15-Aug								5			6		11	22	11	1
18-Aug										6			6	23	0	0
21-Aug							7	2					9	24	0	0
23-Aug							24						24	25	24	1
24-Aug							8						8	26	0	0
26-Aug							7						7	27	0	0
29-Aug							1						1	28	0	0
1-Sep				3			3	3					9	29	0	0
7-Sep			7	35									42	30	42	1
8-Sep				15									15	31	15	1
11-Sep				31									31	32	31	1
12-Sep				33									33	33	33	1

13-Sep				33									33	34	33	1
14-Sep	2			26									28	35	28	1
15-Sep	7			46									53	36	53	1
18-Sep			6	38									44	37	44	1
19-Sep				56									56	38	56	1
20-Sep					3								3	39	0	0
21-Sep				2	2								4	40	0	0
25-Sep	1												1	41	0	0
26-Sep	8			21									29	42	29	1
27-Sep	30			16									46	43	46	1
28-Sep	22			62									84	44	84	1
29-Sep	7			54	3								64	45	64	1
30-Sep	6												6	46	0	0
3-Oct				8	6								14	47	14	1

date	#8 3 ml	#7 Grd	#7 3 ml	#6 3 ml	#6 Trk	#5 Trail	#5 Chp	#5 Trk	#4 Trail	#4 Chp	#4 Trk	#3	TTL	# day	ttl>10	Day >10
5-Oct	41		29										70	48	70	1
6-Oct	30		10										40	49	40	1
8-Oct				8									8	50	0	0
9-Oct	8		1										9	51	0	0
17-Oct			45										45	52	45	1
18-Oct			2										2	53	0	0
19-Oct	5	2	34										41	54	41	1
26-Oct			1										1	55	0	0
3-Nov		1	1										2	56	0	0
11-Nov			1										1	57	0	0
5-Dec	29												29	58	29	1
6-Dec	25												25	59	25	1
11-Dec	4												4	60	0	0
12-Dec	40												40	61	40	1
	265	3	137	487	14	9	92	221	50	60	461	217	2016		1933	42

Eliminating days with truck count below 10 as being indicative of truck or weather problem, the remaining 42 days > 10 hauled 1933 trucks or 1933/42 = 46 trucks / day. That is precisely the number that HHSI figured for production. Therefore, after eliminating days in which management or equipment failed, production met goals.

TAB #13



30 Feet

N W E S

TAB #14

PRESS RELEASE

FOR MORE INFORMATION CONTACT:
Phyllis McDonough Robinson
Community and Public Affairs Manager
435-615-5189

PHOSPHOROUS LOADS IN PARK CITY WATERSHED DECREASES SIGNIFICANTLY

Park City – June 4, 2008

Since 2000 the Environmental Protection Agency (EPA) has identified uncontrolled storm water runoff as one of the largest remaining sources of water quality impairment in Summit County and the United States. Storm water can cause significant water quality degradation, increased flooding, increased erosion, and channel instability. Storm water runoff often carries pollutants such as oil, salts, sediments, fertilizers, and pesticides into waterways.

The 2007 East Canyon Watershed Sub Basin Water Quality Monitoring Results funded by Summit County that has just been released shows Park City significantly reducing the level of contaminants (phosphorous and total suspended solids) in the watershed. In 2000, Park City was identified as contributing to nearly 50 percent of the total phosphorous load within the watershed. However, the recent study reflects these same areas significantly being reduced to 18 percent.

Jeff Schoenbacher, Park City's Environmental Coordinator, attributes the improvement in water quality to Park City's Storm Water Management Plan that went into effect in 2002. Under that plan, the City requires pre and post storm water controls for all construction activities within the City in order to limit sediment loss in order to improve the quality of storm water run-off. In addition, the plan requires public and contractor education as well as the maintenance of sediment detention basins that precipitate out the sediment instead of it entering watershed. Schoenbacher commented that "*these are encouraging results and are testimony to the City's commitment to enforce the*

storm water institutional controls and required engineering controls for new developments. I might add, that the Building Inspectors and Code Enforcement staff deserve and enormous amount of credit in seeing that the storm water controls are installed for all construction sites and all so educating contractors. It is my hope that we continue to have the cooperation from the construction community so we can continue to reduce sediment loss, thereby improving the East Canyon Creek Watershed".

A draft copy of the Water Quality Monitoring Report is available at http://www.eastcanyoncreek.org. In addition, the City's Storm Water Management Annual Report is available on-line through the City's Environmental Data Viewer at http://mapserv.utah.gov/ParkCityGIS/.

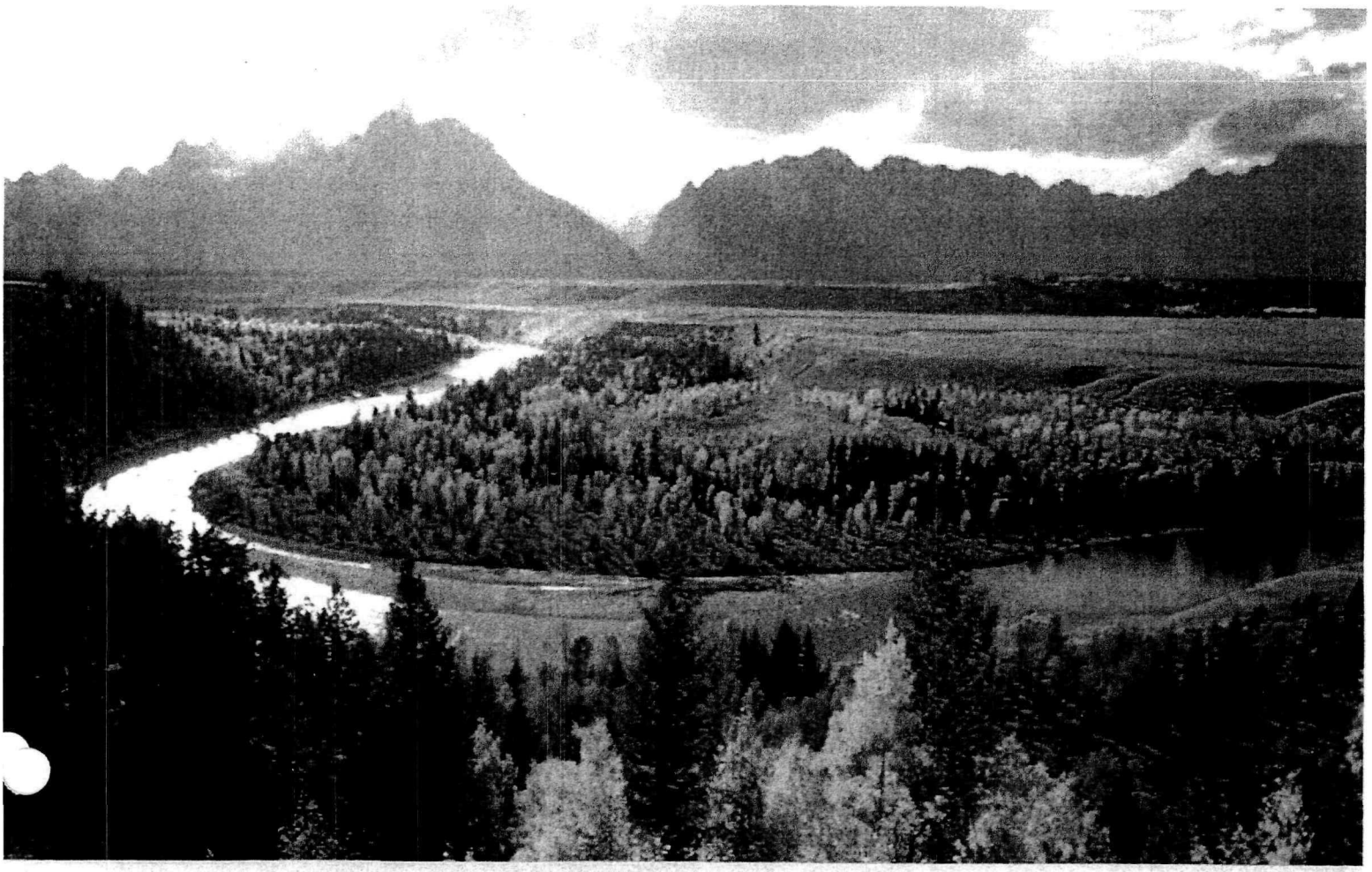
For further information, contact Jeff Schoenbacher, Park City Environmental Coordinator, at 435-615-5058.

###

TAB #15

Integrating Water and Waste Programs to Restore Watersheds

A Guide for Federal and State Project Managers



CASE STUDY

Park City Soil Cover Ordinance

Park City, Utah

The Park City Landscaping and Maintenance of Soil Cover Ordinance (Park City Municipal Code) regulates the handling, disposal and capping of mine tailings in a large portion of the city. The city's Building Department enforces the ordinance pursuant to an agreement between Park City, EPA, and the Utah DEQ. These agencies, in cooperation with other stakeholders and the community, are also exploring opportunities for addressing water quality concerns in addition to the mine tailings issues.

In 1985 Park City proactively developed a strategy to isolate mine tailings from human contact by installing a 6-inch clean topsoil cap on all lots within the soils ordinance boundary. The ordinance made capping mandatory for all residential properties with elevated levels of lead. It also established an action level for capping a lot at 1,000 ppm (lead) for existing development and 200 ppm for new landscaping and imported fill. In addition, the ordinance also required that all landscaping, as well as an established vegetation layer on the property, be maintained. With these standards in place, the city's goal is to maintain and have a barrier between residences and the underlying impacted soils.

It should be noted that property owners must pay for the installation of topsoil caps and have a vested interest in their maintenance and integrity. Working with regulatory agencies, Park City closely monitors the progress of capping projects. To support the city in this effort, Jeff Schoenbacher, Park City's environmental coordinator, implemented ArcGIS to track and manage the compliance activities of all properties within the soils ordinance boundary. Such a system was needed for tracking cap compliance, plotting lead levels, planning utility installations, establishing cleanup levels for development, contacting residents and defining the ordinance boundary.

CASE STUDY

New Hampshire Builds Local Capacity to Reduce NPS

New Hampshire

Many New Hampshire planning initiatives and regulatory measures are developed and implemented at the local level. Although municipal officials are often aware of NPS pollution issues in their communities, few have the capacity to implement measures to reduce NPS at the planning and regulatory stages without direct technical assistance and educational support. To address this issue, New Hampshire's Coastal Nonpoint Pollution Control Program (CNPCP) is working with two regional planning commissions (covering 45 municipalities) to develop and support a technical assistance program to address NPS at the local level through municipal land use planning, regulatory review and development and education. The programs are specifically tailored to address NPS issues unique to each region.

Regional planning staff work one-on-one with town Conservation Commission and Planning Boards to review existing land use regulations relative to NPS, discuss NPS sources at the local level and recommend changes to local land use regulations. Discussed and proposed regulations often address stormwater management, shoreland protection, wetland setbacks, conservation subdivisions and site plan design.

As of Spring 2006, local voters approved eight recommended regulations covering erosion and sediment control, road design standards, wetland and shoreland buffers, aquifer protection, impervious surfaces and stormwater management.

TAB #16

PARK CITY
1884

Building Department • City Engineer • Planning and Zoning

April 20, 2007

Kathy Hernandez
U.S.E.P.A., Region 8
999 18th Street, Suite 300
Denver, CO 80202-2465

RE: April 11th 2007 Meeting Summary

Dear Ms. Hernandez:

I would like to thank you for meeting with us on April 11th 2007 to discuss the Montage Resort and other outstanding environmental issues as it relates to Upper Silver Creek Watershed.

Based on the meeting, PCMC would like to confirm some of the items discussed:

- There is a mutual agreement with Park City, UDEQ, and USEPA regarding the need for additional pre/post storm water controls and UPDES Storm Water Construction Permitting, as defined in Jeff Schoenbacher's memo dated March 11th 2007.

- No changes are necessary to the operation of Richardson Flats, the agreements addressing such, or USEPA's approval of UPCM's plan. The City and third parties may continue to rely on USEPA's approval of UPCM taking additional waste since such waste is Bevill Exempt and there is no additional CERCLA/environmental liability by virtue of such authorized transfer of waste to the facility in accordance with USEPA's approval. This is consistent with the Record of Decision (ROD) for Richarson Flat Tailings Site, under chosen Alternative #3 – "Major Components" – "*Mine waste from the Park City area is placed within the impoundment during implementation of the remedy.*" The ROD goes on to state on page 43 under "Placement of Additional Mine Waste at the Site" – "*There are several reasons why the Richardson Flat Site is an appropriate location for the placement and consolidation of mine wastes from cleanups conducted at other locations in the Watershed. First, the nature of the mine wastes found throughout the watershed is similar. Second, the volume of waste from other locations is extremely small relative to the volume of wastes already present in the impoundment. The impacts from such a small contribution would be negligible. Lastly, the RI has shown that the mine tailings at the site are well contained and present no unacceptable risks to human health. The selected remedy will ensure conditions remain this way and that all other Site risks are addressed. These factors make the Site an acceptable long*

Park City Municipal Corporation • 445 Marsac Avenue • P.O. Box 1480 • Park City, UT 84060-1480
Building Department • (435) 615-5100 • FAX (435) 615-4900
City Engineer • (435) 615-5055 • FAX (435) 615-4906
Planning and Zoning • (435) 615-5060 • FAX (435) 615-4906

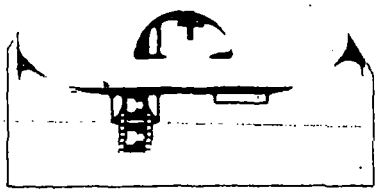
term repository, and, in conjunction with these factors an "off site rule" determination was made and agreed upon in date." Due to these determinations, the City believes the use of Richardson Flat has been approved by USEPA as an acceptable location for the disposal of mine waste generated from within the Silver Creek Watershed.

- During the meeting we discussed considering the biocell within the Silver Creek Watershed as a Best Management Practice (BMP). UDEQ is supportive of constructing this treatment unit and based on our meeting PCMC understands that USEPA is also supportive of this effort. As a result, the City will move forward and plan on building the biocell this summer. The vault is currently being constructed and will be installed in June or July of this year. Once we have firm dates and a contractor established the City would make you and the stakeholders aware of the specifics.

- United Park City Mines (UPCM) has never received an operating permit from Utah Division of Oil, Gas and Mining for the Ontario Mine. It had been the City's expectation that the reclamation and closure of UPCM's mines had and would continue to have regulatory oversight by OG&M. Based on recently discovered information, Park City is now aware that there has never been such oversight and the fact that UPCM has never operated under a mine permit would make future oversight unlikely. This new information leads PCMC to believe there are many unanswered questions with regard to USEPA jurisdiction. Fore instance, since the mine does not have a reclamation plan, has USEPA considered an inventory of all of the impacted mine sites that may require reclamation in conjunction with the approved surface remediation? If so, PCMC would ask that this information be sent to the Park City Building Department for a complete accounting of environmental impacts that reside within the newly annexed areas. In addition, it appears from OG&M files that when the agency deliberated whether they had jurisdiction over the mine and the applicability of the Utah Mined Land Reclamation Act (subsequently determining that the Act did not apply and/or enforcement was likely precluded by statute of limitations), OG&M staff assumed public safety would be addressed by the USEPA in conjunction with the site controls and re-vegetation as part of the remediation approvals. Can the EPA provide PCMC with assurances that actual mine closure, reclamation and associated hazards are in fact addressed as part of the re-vegetation and reclamation plan? If not, what is your understanding of who has regulatory jurisdiction over the mine tunnels and any impacts on the watershed? Should this matter be added to the Stakeholders' agenda?

- Regarding the Judge Tunnel, the question was asked if it meets the definition of a "point source" thereby needing to have a UPDES permit. You stated that the Judge Tunnel does meet the definition of a "point source" and the owner of the tunnel is required to obtain the permit.

- Lastly, we spoke of the discharge from the drainage of the foundation of the Daley West Mine Dump that collects in a drainage system and runs through a pipe. The City would like additional characterization data on the collection system and associated discharge tc verify the discharge complies with the TMDL effluent limits. During the meeting it appears that there is some disagreement in regards to whether this discharge needs a



permit or it is part of the remedial design. The City would like for USEPA and UDEQ to establish a mutual agreement in regards to this issue and convey that position to Park City and UPCM.

With that stated, again I thank you for your time and consideration for meeting with us Monday and clarifying the outstanding issues. The City looks forward to receiving the answers to the questions raised in this correspondence so there continues to be a clear understanding between all Upper Silver Creek Stakeholders. Should you have any questions feel free to contact Jeff Schoenbacher at 435 615 5058 or by email at jschoenbacher@parkcity.org.

Sincerely,

Ron Ivie
Building Official

CC: Mayor Williams
City Council
Tom Bakaly
Mark Harrington
Tom Daley
Jerry Gibbs
Kathy Lundborg
Mo Slam (UDEQ)
Kari Lundeen (UDEQ)
Tom Rushing (UDEQ)
Patrick Putt
Brooks Robinson
Roger Evans
Jeff Schoenbacher

JTS:

TAB #17

Planning Commission Staff Report

PARK CITY 1884

PLANNING DEPARTMENT

Building Department

Subject: Mine Soil Hazard Mitigation Plan for the Flagstaff Mountain Resort.
Author: Jeff Schoenbacher
Date: March 12th 2008
Type of Item: Administrative

Summary Recommendations

Staff recommends the Planning Commission review the staff report, hold a public hearing and consider requiring the applicant to amend the Mine Soil Hazard Mitigation Plan for the Flagstaff Mountain Resort.

Topic

Applicant: United Park City Mines
Location: Empire Canyon and Newly Annexed Land
Reason: Amendment to the Mine Soil Hazard Mitigation Plan

Background

On February 13th 2008 the City received a revised Mine Soil Hazard Mitigation Plan (MSHMP) for the Flagstaff Mountain Resort. The purpose of this staff report is to summarize United Park City Mine's (UPCM) most recent submittal for the Flagstaff Mountain Resort and check for consistency within the original Development Agreement executed May 17, 1994 that states the following:

"Additionally, developer shall reclaim all mining and mining overburden sites within Flagstaff Mountain, in accordance with state and federal regulatory agency review"(Section 2.2.1.6).

The intent of the Mine Soil Hazard Mitigation Plan (MSHMP) is to define the remediation and reclamation of mining impacts within the Empire Canyon, which includes the Flagstaff Project. The outcome of the staff review of the MSHMP is a request to amend the plan outlining dates certain for the completion of mine hazard inventory, reclamation plan, inclusion of the Montage Site Management Plan, Memorandum of Understanding (Richardson Flats to accept soils from the Soils Ordinance Boundary), and an assessment of Empire Creek.

Analysis

There are two types of environmental regulatory land classification within the Flagstaff annexed parcel; the first are areas recognized as "developable", with the second being land classified as the Empire Canyon CERCLIS site, EPA ID#

0002005981. The "developable" parcels reside within the boundaries of the Empire Canyon CERCLIS site; however the United States Environmental Protection Agency (USEPA) and Utah Department of Environmental Quality (UDEQ) have excluded these areas from the stigma of CERCLA authority. In January 2002, USEPA and UPCM outlined and identified clean up standards for the developable areas of Flagstaff. The result is an agreement that all residential developable areas would be mitigated to a standard of <500-ppm lead and <100-ppm arsenic. Regarding the acreage known as the Empire Canyon CERCLIS site, UPCM entered into an Administrative Order on Consent (AOC) in May of 2002. An AOC is a legal agreement signed by USEPA and an individual, business, or other entity through which the party agrees to implement the required corrective or cleanup actions. This agreement can be enforced in court and describes the actions to be taken, which are subject to a public comment period. The first AOC resulted in UPCM doing several studies to determine the extent and nature of the contamination as well as doing an Engineering Evaluation/Cost Analysis (EE/CA). Empire Canyon is a significant contributor to the impairment of the Silver Creek Watershed. As stated in USEPA's report titled "Data Interpretation Report for the Upper Silver Creek Watershed Surface Water Monitoring 2000 dated February 13th 2001 page 31:

Surface water emanating from Empire Canyon has by far the highest concentrations of metals found in the watershed. Zinc levels were up to 17 times higher than the aquatic life standard....

Storm events also have the potential to move large volumes of highly contaminated water or sediment in a very short time. These points, couples with the fact that Empire Canyon is at the "top" of the watershed, suggest that it is a critical point source in the contamination of Silver Creek and should be addressed further.

The Mine Soil Hazard Mitigation Plan was required by Park City to allay long-term environmental regulatory liability and clarify the expectations related to remediation and reclamation of United Park City Mines. The following eight issues are discussed with specific recommendations from staff.

1. Remediation

The new plan specifies that there remain three Parcels identified as D3, P6, and D10 that have not been remediated in accordance with the development agreement.

- Based on the revised plan P6 will be remediated with the commencement of the approval process and prior to any building permits issued for the B2 East Parcel.

- Parcel D3 located above the Ontario Mine below POD A will be remediated during the summer of 2008.
- Parcel D10 located adjacent to the Day Lodge similar to P6 will be remediated with the commencement of the approval process and prior to any building permits issued for the B2 East Parcel.

Recommendations:

Once these parcels have been mitigated, the Building Department recommends that UPCM submit closure reports that verify the remediation is completed along with confirmation sampling results. Lastly, it is strongly recommended that USEPA "comfort letters" for all three parcels be submitted to the Building Department for the record. This coincides with the January 2004 submittal that states *"United Park will also work with the EPA to obtain comfort letters for these remaining parcels."* Lastly, firm dates should be established for all parcels.

2. Empire Creek

Empire Creek is considered mapped "waters of the state of Utah"[1], which starts approximately 2,200' up gradient from the Montage Resort Building footprint. In Mr. Smith's memo dated January 24th 2008 he mentions that Empire Creek has been remediated and "materials were physically excavated and removed, and a new stream channel was constructed using clay-rich materials, rip-rap and topsoil."[2] However, the Building Department has witnessed the improvements in Empire Creek failing on two separate occasions resulting in excessive erosion and flooding due to poor engineering design and controls. The City understands that the Athens Group brought in another consultant that examined the Empire Canyon drainage "improvements" and also expressed concern with the completed work. Consequently, Ron Ivie and Eric Dehaan were told that they were in the process of drafting a separate proposal for Empire Creek.

Recommendations:

Since the long term integrity of Empire Creek is extremely important to Park City. Staff recommends that the Athens Group evaluation be submitted to the Building Department and that a third party evaluator be retained to examine the drainage and provide recommendations based on the actual hydrologic conditions that occur in Empire Creek during spring run-off.

---

[1] Utah Water Quality Act 19-5-102 (18) "Waters of the state": (a) means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion of the state; and (b) does not include bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance, a public health hazard, or a menace to fish or wildlife.

[2] January 24th 2008 D. Smith Memo Page 2 – 5th Paragraph

3. Mine Hazard Inventory and Reclamation Plan

As stated in the original Development Agreement executed May 17, 1994:

"Additionally, developer shall reclaim all mining and mining overburden sites within Flagstaff Mountain, in accordance with state and federal regulatory agency review"(Section 2.2.1.6).

During the development of the Flagstaff Development project it was assumed that all reclamation was being conducted in accordance with Utah's Division of Oil, Gas, and Mining. The City made that conclusion based on the following statements made by UPCM representatives such as Kevin Murray, UPCM legal counsel, December 2nd 2003;

"United Park strongly disagrees with the City's suggestion that United Park "has yet to fully accomplish" mine reclamation requirements "in accordance with state and federal regulatory agency review" as stated in the original Development Agreement. All applicable mine reclamation requirements imposed upon United Park by state or federal law have been fully satisfied."

"United Park's obligation under the Development Agreement is to reclaim all mining and mining overburden sites within Flagstaff Mountain, in accordance with state and federal regulatory requirements."

Stated in United Park City Mines Company SEC Annual Report (1998-2003);

"The maintenance activities on a number of these shafts and adits are undertaken to provide that all types of equipment are in adequate condition, that underground transportation and ventilation systems are adequate and that the Company is in compliance with its governmental permits and regulations."

Mr. Smith states that "*United Park's mining activities ceased years before the enactment of the Utah Mined Land Reclamation Act of **1975**, United Park has never been subject to the Act nor could it obtain a permit under the Act.*"[3] However, based on the statements made in the SEC reports and UPCM representatives the mine was considered a mining company well after the Act, but failed to obtain the necessary permits that would include a reclamation plan by Division of Oil, Gas, and Mining (DOGM). As stated in the SEC Annual Reports (1998-2003 General second paragraph):

*"United Park acquired mining properties in the Park City area upon its formation in 1953. Prior to **1982**, United Park's principal business was the mining of lead, zinc, silver, gold, and copper ore from these properties or the leasing of these properties to other mine operators. United Park now conducts no active mining operations and has no agreement to sell or lease its mining properties. The*

[3] David Smith Memo to Brooks Robinson June 25th 2007 Subject: Mine Soil Hazard Mitigation Plan

mining properties are maintained on a stand-by basis. The company also performs mine and tunnel maintenance for other entities on a contract basis."

And as recently as January 2004, the update to the Mine Soil and Physical Mine Hazard Mitigation Plan, written by Kerry Gee, the following is stated:

*"Mining activity essentially ceased in the early **1980's** at the Ontario Mine."*[4]

Lastly, as documented in the DOGM historical file, United Park City Mines Company had an enforcement file to force the mine to obtain a permit as early as June 16th 1992, thereby requiring a permit and reclamation[5]. DOGM staff felt strongly that a permit was required; however the Division did not act upon the Notices of Intentions in a timely manner. As a result, the DOGM retains the current position that the mines in Empire Canyon are not mines subject to their jurisdiction[6].

Nonetheless, the above statements directly contradict Mr. Smith's statements in regards to the applicability of a Mine Operating Permit, thereby requiring a Mine Reclamation Plan. The USEPA's Order on Consent, Consent Order, Work Plan and Action Memorandum does not address mine reclamation and closure of mine hazards. It does not; nor did USEPA intend to address these issues within these documents. Mr. Kevin Murray, legal counsel for United Park City Mines eloquently described it best in the following statement:

"It is important for the City to understand that mine "reclamation" is not synonymous with environmental remediation. Reclamation normally refers to remedying physical hazards and impacts of past mining and is normally subject to bonding requirements, while environmental remediation contemplates remedying unacceptable contaminant levels in soil and water."[7]

USEPA is not overseeing the reclamation and has never addressed this issue as requested in formal comments[8].

Recommendations:

As a result, PCMC is recommending an amendment to the Plan to require a Reclamation Plan for mine impacts residing within the City limits (this coincides with the obligations within the development agreement). The Plan should identify all private entities that are providing the oversight in regards to the reclamation and closure of mine hazards. The reclamation plan is expected to be a

---

[4] History – Page 3 Paragraph 6

[5] D. Wayne Hedberg, Permit Supervisor Memo – Proposed Inspection Meeting, United Park City Mines Company, Ontario Mine, M/043/003, Summit County, Utah

[6] Letter to Mark Harrington from Mary Ann Wright Associate Director of DOGM March 14th 2007.

[7] LeBoeuf, Lamb, Greene & Macrae – Kevin R. Murray December 2nd 2003, Comments on Flagstaff Development Environmental Report

[8] See USEPA Region 8 letter to Kathy Hernandez dated April 20th 2007

comprehensive document that defines reclamation standards, re-vegetation, and post closure monitoring. Using DOGM standards as a guideline, at a minimum the amendment should include the following:

- Inventory of all mine hazards.
- Mine Reclamation Plans with specific closure dates.
- Applicable reclamation standards.
- Re-vegetation standards.
- Re-vegetation standards.
- Post Closure Monitoring.

4. PCB Transformer Inventory

USEPA regulates the use, storage and disposal of PCB Transformers and PCB-Contaminated Transformers containing between 50 and 499 ppm PCBs within 40 CFR Part 761 under the Toxic Substances Control Act (TSCA).

Mr. Smith states; *"None of the transformers related to the historical mining operations are known to contain PCB's. It is United Park's understanding that any remaining transformers containing PCB's were removed by Noranda in the early 1980's. PCMR is obligated to operate the Resort in compliance with applicable laws and regulations."*[9]

In the most recent Mine Soil Hazard Mitigation Plan the following inventory of transformers was provided:

- Daly West Mine 3
- Ontario #3 6
- Thaynes Borehole 3
- Thaynes Shaft 3

The most recent plan reiterates that Noranda Mining Company retrofilled the transformers in the 1980's, thereby removing the PCB's. However, no analytical was provided verifying that statement. As a result, UPCM is proposing to sample all transformers and any impacted soils by August 1st 2008.

Recommendations:

Depending on the concentrations discovered from the sampling the Building Department requests the analytical results be submitted to the Fire Marshall and a management plan that fully complies with Toxic Substance Control Act within 40 CFR 761. Until then the Building Department believes the following is applicable since these units did contain PCB's and would potentially be considered PCB contaminated.

---

[9] January 24th 2008 D. Smith Memo Page 3 – 1st Paragraph

As stated under 40 CFR 761.2 (a)(3)(4) "PCB concentration assumptions for use.":

(3) Any person must assume that a transformer manufactured prior to July 2, 1979, that contains 1.36 kg (3 pounds) or more of fluid other than mineral oil and whose PCB concentration **is not established**, is a PCB Transformer (i.e. 500 ppm). If the date of manufacture and the type of dielectric fluid are unknown, any person must assume the transformer to be a PCB Transformer.

(4) Any person must assume that a capacitor manufactured prior to July 2, 1979, whose PCB concentration is not established contains ≥500 ppm PCBs. Any person may assume that a capacitor manufactured after July 2, 1979, is non-PCB (i.e., < 50 ppm PCBs). If the date of manufacture is unknown, any person must assume the capacitor contains ≥500 ppm PCBs. Any person may assume that a capacitor marked at the time of manufacture with the statement "No PCBs" in accordance with §761.40(g) is non-PCB.

Lastly, the Building Department is aware of other historic mine transformer units such as the Silver King Mine that are now in the city limits that are not labeled or classified in accordance with TSCA. Under Chapter 27 Fire Code Hazardous Material Management Plan the Fire Marshal will request an inventory of these units and associated PCB concentrations and TSCA classification. It is recommended that these units be identified within the reclamation plan with associated PCB concentrations, management plan, USEPA Registration, and dates certain for disposal.

5. Montage Resort (MR) Post Closure Site Control Plan

On July 30th 2003 PCMC submitted a letter[10] to Jim Christiansen asking him that there be a definitive owner to any tailings areas that remain in place that will require long term maintenance and stewardship. On August 20th 2003 Mr. Christiansen replied with the following:

"A post-removal site control plan is required under the AOC. The AOC will bind UPCM and future owners to ongoing maintenance."[11]

Additionally as stated by Kerry Gee in the January 2004 submittal Mitigation Plan:

"The Post Removal Site Control Plan prepared for the Non Time Critical Removal Action will be implemented for the site."

---

[10] Tom Bakaly to Jim Christiansen dated July 30th 2003
[11] Jim Christiansen to Tom Bakaly dated August 20th 2003

The Montage Resort leases the land and Talisker owns the property therefore as "owners", and consistent with the AOC and previous statements by the project manager, the owners are required to develop the site management plan.

Recommendations:

Due to the recognition that the MR will be backfilled with regulated mine tailings from the Daley West Mine Dump. Talisker will be responsible for the Post Closure Site Control Plan for the MR and it will need to be completed and included as an addendum to the Mine Soil Hazard Mitigation Plan.

This will allow PCMC to clearly understand who is going to be responsible for the management of the environmental engineering controls and any emergency response issues that may require the generation of mine tailings (i.e. utility work ect.). By doing so the City will not inherit any more environmental liability related to mine tailings, without a clear understanding of who owns the site and who is responsible for the management and disposal of generated tailings.

6. Memorandum of Understanding – Richardson Flats

The May 10th 2005 Memorandum of Understanding between PCMC and Talisker recognizing the use of Richardson Flats for those entities within the Soils Ordinance Boundary is absent from the plan as an addendum.

Recommendations:

Amend the Mine Soil Hazard Mitigation Plan to include this agreement between Talisker and PCMC – signed by Tom Bakaly and Jim Tadeson. The importance of this document allows residential and other property owners impacted with mine tailings to utilize the repository at Richardson Flats.

7. Deed Restrictions

As agreed upon, the deed restriction language that recognizes the Post Closure Site Control Plan and the existence of mine tailings underlying the MR needs to be an addendum to the plan.

Recommendation:

The recorded deed restriction language should be included into the Mine Hazard Mitigation Plan as addendum.

8. Access Issues

In accordance with Fire Plan Contingency a second access plan to the development is requested by the Fire Marshall (Ron Ivie).

Recommendation:

Submit the Access Plan to the Fire Marshall by July 1st, 2008.

Notice

Legal Notice was published in the Public Record.

Public Input

No public input has been received at the time of drafting this report.

Alternatives

- The Planning Commission may request an amendment to the Mine Soil Hazard Mitigation Plan as outlined in Attachment A.
- Park City may request an amendment to the Mine Soils Hazard Mitigation Plan as outlined in Attachment A with direction to staff on necessary revisions.
- Park City may continue the discussion.
- Planning Commission may direct staff not to alter the current Mine Soils Hazard Mitigation Plan.

Significant Impacts

The City will inherit additional long-term regulatory liability if the recommendations are not followed. There are significant fiscal and environmental impacts involved with the mitigation plan.

Consequences of not taking the Suggested Recommendation

UPCM impacts and responsibilities become Park City's impacts and responsibilities that the taxpayers pay for.

Recommendation

Hold UPCM to their obligations under the Development Agreement. To ensure the environmental impacts and mine hazards within the new phases of development are adequately mitigated to protect the health, safety, and welfare of the community.

Attachment A
Summary of Recommendations

#1 Remediation:

Once these parcels have been mitigated, the Building Department recommends that UPCM submit closure reports that verify the remediation is completed along with confirmation sampling results. Lastly, it is strongly recommended that USEPA "comfort letters" for all three parcels be submitted to the Building Department for the record. This coincides with the January 2004 submittal that states *"United Park will also work with the EPA to obtain comfort letters for these remaining parcels."* Lastly, firm dates should be established for all parcels.

#2 Empire Creek:

Since the long term integrity of Empire Creek is extremely important to Park City. Staff recommends that the Athens Group evaluation be submitted to the Building Department and that a third party evaluator is retained to examine the drainage and provide recommendations based on the actual hydrologic conditions that occur in Empire Creek during spring run-off.

#3 Mine Hazards and Reclamation:

Staff recommends an amendment to the Plan to require a Reclamation Plan for all mine impacts residing within the City limits (this coincides with the obligations within the development agreement). The Plan should identify all private entities that are providing the oversight in regards to the reclamation and closure of mine hazards. The reclamation plan is expected to be a comprehensive document that defines reclamation standards, re-vegetation, and post closure monitoring. Using DOGM standards as a guideline at a minimum the amendment should include the following:

- Inventory of all mine hazards.
- Mine Reclamation Plans with specific closure dates.
- Applicable reclamation standards.
- Re-vegetation standards.
- Re-vegetation success standards.
- Post Closure Monitoring.

#4 PCB Transformers:

Depending on the concentrations the Building Department requests the analytical be submitted to the Fire Marshall and a management plan that fully complies with Toxic Substance Control Act within 40 CFR 761. Until then the Building Department believes the following is applicable since these units did contain PCB's and would potentially be considered PCB contaminated.

As stated under 40 CFR 761.2 (a)(3)(4) "PCB concentration assumptions for use.":

(3) Any person must assume that a transformer manufactured prior to July 2, 1979, that contains 1.36 kg (3 pounds) or more of fluid other than mineral oil and whose PCB concentration **is not established**, is a PCB Transformer (i.e.500 ppm). If the date of manufacture and the type of dielectric fluid are unknown, any person must assume the transformer to be a PCB Transformer.

(4) Any person must assume that a capacitor manufactured prior to July 2, 1979, whose PCB concentration is not established contains ≥500 ppm PCBs. Any person may assume that a capacitor manufactured after July 2, 1979, is non-PCB (i.e., < 50 ppm PCBs). If the date of manufacture is unknown, any person must assume the capacitor contains ≥500 ppm PCBs. Any person may assume that a capacitor marked at the time of manufacture with the statement "No PCBs" in accordance with §761.40(g) is non-PCB.

Lastly, the Building Department is aware of other historic mine transformer units such as the Silver King Mine that are now in the city limits that are not labeled or classified in accordance with TSCA. Under Chapter 27 Fire Code Hazardous Material Management Plan the Fire Marshal will request an inventory of these units and associated PCB concentrations and TSCA classification. It is recommended that these units be identified within the reclamation plan with associated PCB concentrations, management plan, USEPA Registration, and dates certain for disposal.

#5 Montage Site Management Plan:

Due to the recognition that the MR will be backfilled with regulated mine tailings from the Daley West Mine Dump. Talisker will be responsible for the Post Closure Site Control Plan for the MR and it will need to be completed and included as an appendix to the Mine Soil Hazard Mitigation Plan. This will allow PCMC to clearly understand who is going to be responsible for the management of the environmental engineering controls and any emergency response issues. By doing so the City will not inherit any more environmental liability related to mine tailings without a clear understanding of who owns the site and who is responsible for the management of generated tailings.

#6 Memorandum of Understanding:

Amend the Mine Soil Hazard Mitigation Plan to include this agreement between Talisker and PCMC – signed by Tom Bakaly and Jim Tadeson. The importance of this document allows residential and other property owners impacted with mine tailings to utilize the repository.

#7 Deed Restrictions:

The recorded deed restriction language should be included into the Mine Hazard Mitigation Plan as addendum.

#8 Access Plan:

Submit the Access Plan to the Fire Marshall by July 1st, 2008.

TAB #18

EPA/ROD/R08-05/046
2005

EPA Superfund
Record of Decision:

RICHARDSON FLAT TAILINGS
EPA ID: UTD980952840
OU 1
PARK CITY, UT
07/06/2005

Richardson Flat Tailings Site
Park City, Utah

Record of Decision

DECLARATION OF THE RECORD OF DECISION

SITE NAME AND LOCATION

The Richardson Flat Tailings Site (Site) is located is located 1.5 miles northeast of Park City, Utah, and is part of a 650 acre property owned by United Park City Mines (UPCM) Company. The Site is a tailings impoundment that covers 160 acres in the northwest comer of the UPCM property, a small portion of the much larger Upper Silver Creek Watershed. The U.S. Environmental Protection Agency (EPA) Comprehensive Environmental Response, Compensation and Liability Information system (CERCLIS) Site Identification Number is UT980952840.

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedy for the Richardson Flat Tailings Site. This ROD has been developed in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, 42 U.S. Code (USC) §9601 et. seq. as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan(NCP), 40 CFR Part 300. The decision is based on the Administrative Record for the Site.

This remedy was selected by EPA Region 8. The Utah Department of Environmental Quality (UDEQ) concurs with the selected remedy.

ASSESSMENT OF THE SITE

The response action selected in the ROD is necessary to protect public health and the environment from actual or threatened releases of hazardous substances into the environment. Such a release or threat of release may present an imminent and substantial endangerment to public health or welfare or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy addresses mine tailings located in several areas of the Site, including the main impoundment, a section south of the diversion ditch, and the wetlands below the embankment. Other media addressed through the selected remedy are sediments and surface water located within the Site boundary. The mine tailings and other media are not considered principal threat waste; therefore, appropriate remedial actions for the waste include excavation of the tailings and containment of the tailings through capping. Additionally, the selected remedy allows for future disposal of mine tailings from the Park City area within the tailings impoundment and placement of restrictions on future land and groundwater use.

Major Components

- Tailings in critical areas outside the impoundment (Area B) are excavated and moved inside the impoundment
- Existing soil cover is augmented to achieve a depth of at least 18 inches of soil above tailings
- Sediments in diversion ditch are covered with clean gravel
- Contaminated sediments and soils in the wetland below the embankment are excavated and material is placed within the impoundment. Wetlands will be restored.
- Mine waste from the Park City area is placed within the impoundment and covered with 18 inches of soil above the tailings. Disposal of mine waste will cease once the remedy has been implemented
- Embankment is fortified to prevent catastrophic failure
- Institutional controls (easements and land use restrictions) are implemented to protect soil cover and prevent ground water use
- Surface water monitoring is ongoing

STAUTORY DETERMINATIONS

The selected remedy is protective of human health, and welfare, and the environment, complies with federal and state requirements that are applicable or relevant and appropriate for the remedial action, is cost effective and utilizes permanent solutions and alternative treatment technologies to the extent practicable.

Because this remedy will result in hazardous substances or pollutants or contaminants remaining on Site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within 5 years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record for this Site.

- Chemicals of Concern (COC's) and their respective concentrations. (Section 7.1.1 and Section 7.2.1)
- Baseline risk represented by the COCs. (Section 7)
- Cleanup levels established for COCs and the basis for the levels. (Section 7.2.5)
- Whether source materials constituting principal threats are found at the Site. (Section 11)

- Current and reasonably anticipated future land use assumptions and current and beneficial uses of groundwater used in the baseline risk assessment and ROD. (Section 6)
- Potential land and groundwater use that will be available at the Site as a result of the selected remedy. (Section 12.4)
- Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected. (Section 12.3)
- Key factors that led to selecting the remedy. (Section 12.1)

AUTHORIZING SIGNATURE

This Record of Decision documents the selected remedial action to address the contamination at the Richardson Flat Tailing site.

The following authorized official at EPA Region 8 approves the selected remedy as described in this ROD.

Max H. Dodson — Date: 7/6/05

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection and Remediation
U.S. Environmental Protection Agency, Region 8

The following authorized official at the State of Utah concurs with the selected remedy for the Richardson Flat Tailings site as described in this ROD.

Dianne R. Nielson — Date: 7/29/05

Dianne R. Nielson, Ph.D.
Executive Director
Utah Department of Environmental Quality

CONTENTS

APPENDICES

TABLES

TABLES (continued)

FIGURES

DECISION SUMMARY

SECTION 1

SITE NAME, LOCATION AND DESCRIPTION

The Richardson Flat Tailings (RFT) site (Site) is located 1.5 miles northeast of Park City, Utah, and is part of a 650 acre property owned by United Park City Mines (UPCM) Company (Figure 1). The Site is a tailings impoundment that covers 160 acres in the northwest corner of the UPCM property, a small portion of the much larger Upper Silver Creek Watershed (Figure 2). Silver Creek is the primary surface water source found in the area and is comprised of runoff from three significant drainages in the watershed, including Ontario Canyon, Empire Canyon and Deer Valley (Figure 3). Silver Creek is currently listed on Utah's 303(d) list for zinc and cadmium and is targeted for total maximum daily load (TMDL) development. Historic mining activities in the canyons)eft behind six active Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites, including Empire Canyon, Silver Creek Tailings, and Silver Maple Claims, each one impacting Silver Creek in some way. While zinc and cadmium are the primary heavy metals found in Silver Creek, lead and arsenic are the main contaminants in the sediments and soils of the watershed. Because of the volume of mining activity throughout the district and the dynamics of the watershed hydrogeology, it is difficult to target any one site as the main source of contamination affecting Silver Creek and the environmental media within the watershed. The overall remedial goal for the watershed is to clean up the surrounding sites, including the Site, thereby eliminating current and future hazards to human health and welfare and the surrounding environment,

The RFT site is a geometrically closed basin, bound by highway 248 to the north, a main embankment to the west, and diversion ditches to the south and the northeast (Figure 4). Silver Creek can be found on the northwest border of the Site, separated from the Site by a small stretch of wetlands and riparian vegetation. The impoundment was used as a mine tailings reservoir prior to 1950. The Site now houses approximately seven million tons of sand-sized carbonaceous particles and minerals containing zinc, silver, lead, and other metals. Use of the Site by UPCM ended in 1982. To date, the Site is not listed on the National Priorities List (NPL). The Site was considered for listing in both 1988 and 1992. UPCM, the primary potentially responsible party (PRP), has taken responsibility for funding the majority of the remedial action at the Site.

SECTION 2

SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORICAL LAND USE

In 1953, UPCM was formed through the consolidation of Silver King Coalition Mines Company and Park Utah Consolidated Mines Company. At that time, the Site was already being used as an impoundment for mine tailings consisting primarily of sand-sized carbonaceous particles and minerals containing lead, zinc, silver and other metals. Additionally, tailings were transported to and placed in several distinct low elevation areas in the southeast portion of the Site just outside of the main impoundment.

In 1970, with renewed mining activity in the area, Park City Ventures (PCV), a joint venture partnership between Anaconda Copper Company and American Smelting Company (ASARCO), entered into a lease agreement with UPCM. This agreement allowed PCV to deposit additional mine tailings at the Site; however, the Site had to be partially reconstructed. Dames and Moore provided PCV with design, construction and operation specifications which were approved by the State of Utah. These specifications included installation of a large embankment along the western edge of the impoundment, and construction of containment dike structures along the southern and eastern borders of the Site for additional tailings storage. PCV also created a diversion ditch system along the higher slopes north of the impoundment and outside of the containment dikes along the east and south perimeters of the impoundment to collect surface run off. As part of the approval process for the renewed use of the Site, the State of Utah required installation of groundwater monitoring wells near the base of the main embankment.

Over the course of PVC's use of the Site, about 450,000 tons of tailings were deposited at the Site through a slurry pipeline that originated at their mill facility. Dames and Moore had recommended that the tailings be deposited around the perimeter of the Site, moving towards the center of the Site over time. However, PVC chose to deposit the tailings from the slurry pipeline in one constant area in the center of the impoundment, creating a steep, cone-like structure in the middle of the impoundment. After PVC discontinued their use of the Site in 1982, high winds caused tailings from the cone-shaped feature to become airborne, creating a potentially significant exposure pathway. These operations shaped the topography of the impoundment which still exists today.

From 1980 to 1982, Noranda Mining, Inc, leased the mining and milling operations and placed an additional 70,000 tons of tailings at the Site, Since then no further use of the Site has occurred, but UPCM began taking actions aimed at improving environmental conditions of the Site almost immediately after operations stopped. This work continued intermittently through the mid-1990s. These actions are described in the Site Characteristics Section of this Record of Decision (ROD).

2.2 INVESTIGATION HISTORY

EPA became aware of the Site in the mid-1980s. After initial site assessment work, EPA proposed the Site for listing on the NPL in 1988. After considering public comment, EPA did not pursue the Site for listing on the NPL. By 1992, the Hazard Ranking System (HRS) had been revised and EPA again proposed the Site for listing on the NPL. Ultimately, EPA decided not to pursue final listing on the 5FPL, and the Site remains proposed for the NPL at this time.

Subsequent to the second NPL proposal, the EPA Region 8 Superfund Emergency Response Branch conducted an investigation under the "Make Sites Safe" Initiative in 1993. This investigation concluded that conditions of the Site did not warrant emergency removal actions, but may present unacceptable risks to human health and the environment and should be addressed through long-term remedial action.

Throughout the 1990s, EPA and the Utah Department of Environmental Quality (UDEQ) were hoping UPCM would address the Site through the Utah Voluntary Cleanup Program. UPCM decided against this, but at the same time continued to voluntarily take steps to improve environmental conditions at the Site. Additionally, UPCM began collecting hydrogeologic data, which was used to better understand the groundwater flow and depth of tailings at the Site.

In 1999, EPA, UDEQ, UPCM, Park City Municipal Coq»ration, and other stakeholders formed the Upper Silver Creek Watershed Stakeholder's Group (USCWSG). This community-based organization was formed to help EPA address Superfund-related environmental issues in the Park City area in a cooperative fashion, including issues related to the Site. The USCWSG has been very successful and several investigations and cleanups have occurred in Park City as a result. Early in USCWSG's history, UPCM and EPA agreed to address the Site as an "NPL equivalent" site, using the same process for investigation and cleanup that is required for a NPL Site.

2.3 ENFORCEMENT HISTORY

EPA and UPCM signed an Administrative Order on Consent (AOC) on September 28, 2000 which called for UPCM to conduct a Remedial Investigation/Focused Feasibility Study (RI/FFS) for the Site. EPA and UPCM have continuously worked well together since the inception of the USCWSG, and because of this, EPA was able to employ increasingly reduced oversight for the RJ/FFS as it progressed. The RI/FFS conducted by UPCM provided the data and information used in this ROD.

EPA conducted two Potentially Responsible Party (PRP) Searches for the Site that identified several parties that may have some liability for cleanup of the Site. The Site owner, UPCM, has conducted the RI/FFS pursuant to an Administrative Order on Consent (AOC). EPA has been facilitating the allocation of costs of investigation and cleanup been the PRP's and UPCM has indicated its willingness to enter into a Consent Decree (CD) with EPA for conduct of remedial design and remedial action.

SECTION 3

COMMUNITY PARTICIPATION

EPA recently published a Proposed Plan describing the preferred remedy at the Site. The Proposed Plan, released for public comment on September 4, 2004, was followed by a public meeting held on September 28, 2004. The public comment period on the proposed plan ran from September 5, 2004 to October 4, 2004. All comments received during this period are addressed in the Responsiveness Summary of this ROD

Throughout the] 980's and early 1990s, there was significant opposition to cleanup of the Site under CERCLA authority. Public participation consisted primarily of comments on the proposed listings and letters to EPA urging that neither site be listed on the NPL.

Since the formation of the USCWSG in 1999, community participation in Park City has increased and improved. The USCWSG meets regularly, in well-advertised open meetings. The participants receive updates on individual sites in the watershed and discuss issues in a cooperative format. The USCWSG has developed a web-site, funded by UPCM, which details actions related to the environmental investigations and cleanup. The EPA project manager discusses the Site periodically with the local radio talk show and the local newspaper reporter. An information repository, which includes the Administrative Record (AR) for the Site, was established at the Park City Library and Education Center. Numerous public meetings have occurred on both general issues and to fulfill requirements for particular sites in the watershed. Fact Sheets are produced annually with updates on progress. Throughout conduct of the RI/FFS at the Site, UPCM and EPA have provided information to the public through all of these routes.

SECTION 4

SCOPE AND ROLE OF RESPONSE ACTION

The Site is one of several historic mining sites in the Upper Silver Creek Watershed. At present, six of these sites are listed in the CERCLIS database, and several more are being considered for f4ture Superfund action. The past and present impacts to surface water and sediment in Silver Creek result from the cumulative contributions of these sites over decades. Because of the high density of sites in a relatively small area, as well as the long history involved, it is often difficult to apportion specific problems to a particular site or time period. For example, sites upstream of Richardson Flat, such as Empire Canyon or Prospector Square, have impacted surface water and sediment conditions at and below Richardson Flat. However, it is difficult to determine exactly what contribution each made. For this reason, EPA has sought to investigate and remediate the Upper Silver Creek Watershed as a who)e, rather than trying to investigate each site separately. This ensures that remedies selected for the individual sites are complementary fo each other and work toward the goal of cleaning up the entire watershed. This ROD addresses only the actions necessary to address actual and potential impacts specific to the Site, but it is part of a broader strategy to clean up the entire Silver Creek Watershed in a consistent, efficient manner.

The remedy selected by EPA and documented in this ROD includes remedial actions necessary to protect human health or welfare or the environment. The ROD is based primarily upon information set forth in the RI/FFS recently conducted by UPCM. An important purpose of the RI/FFS and associated risk assessment was to evaluate the efficacy of these voluntary actions and the risks posed by the Site in its current condition. For instance, there is a soil cover across the tailings impoundment that was put in place by UPCM in the 1990s. The RI/FFS evaluated the soil cover and showed it protects groundwater and other media at the site from becoming heavily contaminated. The risk assessment determined that under the current conditions, threats to human health are low. However, it is clear that in the absence of this soil cover, both human and ecological receptors would be exposed to high concentrations of heavy metals and contaminants would be free to migrate from the Site, thereby increasing the risk to human health and the environment. Thus, decisions on remedial actions must consider not only the risks posed by current conditions, but also the risks posed if current conditions changed. The selected remedy will enhance and ensure the integrity of the soil cover, reinforce the tailings embankment, and protect surface and ground waters from additional metals loading by containing the low level threat waste, thereby mitigating and abating the actual and potential risks to human health or welfare or the environment at the Site. Further, institutional controls will minimize potential, future, uncontrolled, human contact with contamination in any of the Site media.

SECTION 5

SUMMARY OF SITE CHARACTERISTICS

This section summarizes the information obtained through the investigations and feasibility studies. It includes a description of the Site conceptual model on which the investigations, risk assessments and response actions are based. The major characteristics of the Site and the nature and extent of contamination are summarized below. More detailed information is available in the Administrative Record for the Site.

5.1 SITE CONCEPTUAL MODEL

The illustrated site conceptual model depicted in Figure 5 is a representation of the location, and movement of contamination at the Site and any potential impacts that may occur to human health, the environment, or beneficial uses of resources. Presently, the tailings in the main impoundment (Area A) and the tailings south of the diversion ditch (Area B) are considered the primary waste sources. Impacted media at the Site include sediments in the south diversion ditch and the wetland area, and the surface waters. Surface water sources include the wetlands area, Silver Creek, the site pond, and intermittent flow in the diversion ditches and unnamed drainages. Seasonally, accumulated precipitation and snow melt can be found on the surface of the main impoundment. There is a clay layer underlying the tailings in Area A and Area B, so infiltration of groundwater into the underlying aquifer is limited. Additionally, heavy metal releases from the tailings are currently contained to a certain degree by a low permeability soil cap that was placed there by UPCM in the 1990's. Therefore, potential exposure to future Site users including high and low-intensity recreational visitors is limited. However, these possible exposure pathways include ingestion of soils/tailings and sediment, dermal exposure to surface water, and inhalation of particulates in air. The ecological exposure pathways and receptors are described in detail in Section 7.2, Ecological Risk.

5.2 OVERVIEW OF THE RICHARDSON FLAT TAILINGS SITE

The Site is located in a broad valley with undeveloped rangeland. The Site is about 6,570 feet above mean sea level and is characterized by a cool, dry, semi-arid climate (RMC, 2003). Meteorological stations located in Park City, Utah and Kamas, Utah estimate an annual precipitation of about 20 inches of water, an average low temperature of about 30°F, and an average high temperature of about 57°F (RMC, 2003).

5.2.1 Site Features

As described in the Site History, mine tailings have been deposited at the Site since 1950. For two decades, tailings were systematically deposite4 in the impoundment via a slurry line and eventually filled in all low lying areas (Area A). In 1970, PCV took ever the use of the impoundment, which required several structural changes and improvements, including enlargement of the main embankment in the northwestern corner of the Site, construction of

containment dikes along the southern and eastern borders of the impoundment, and construction of a diversion ditch system outside the impoundment along the east and south perimeters. On the south end of the impoundment, the diversion ditch was cut through an area of existing tailings, resulting in some tailings being located outside (south of) the present day boundaries of the impoundment (Area B). These additions, as well as the tailings south of the diversion ditch, make up the main surface features of the Site. The Study Area Boundary includes the tailings south of the diversion ditch and the main impoundment. The Site characteristics can be found in Figure 4.

Impoundment and Containment Dikes

The majority of the tailings at the Site are contained in the impoundment basin, with a large earth embankment in place along the western edge of the Site (Area A). The "main embankment" is vegetated and is approximately 40 feet wide at the top, 800 feet long, and has a maximum height of 25 feet. A series of man-made dikes contain the tailings along the southern and eastern perimeter of the impoundment. The northern edge of the impoundment is naturally higher than the perimeter dikes.

Off-Impoundment Tailings

Additional tailings materials are present outside and to the south of the current impoundment area (Area B). During historic operations of the tailings pond, tailings accumulated in three naturally low-lying areas adjacent to the impoundment. Starting in 1983, UPCM covered these off-impoundment tailings with a low-permeability, vegetated soil cover. However, recent surveys of off-impoundment cover soils indicate that, st some locations, soil cover is thin or absent, leaving exposed surface tailings (RMC, 2001a). In addition to these off-impoundment tailings deposits, prevailing winds from the southeast carried tailings from the main impoundment and deposited them in the surrounding areas.

Diversion Ditches and Drainages

A diversion ditch system borders the north, south, and east sides of the impoundment to prevent surface water runoff from the surrounding land from entering the impoundment. Precipitation falling on the impoundment area creates a limited volume of seasonal surface water. The north diversion ditch collects snowmelt and storm water runoff from upslope, undisturbed areas north of the impoundment and carries it in an easterly direction towards the origin of the south diversion ditch. An unnamed ephemeral drainage to the southeast of the impoundment also enters the south diversion ditch at this point. Additional water from spring snowmelt and storm water runoff enters the south diversion ditch from other areas lying south of the impoundment at a point near the southeast corner of the diversion ditch structure.

Site Wetlands and Pond

Water in the south diversion ditch flows from east to west and ultimately empties into Silver Creek near the north border of the Site. Before its confluence with Silver Creek, water from the south diversion ditch enters a small one acre pond (RMC, 2003). Water exiting the pond flows in

a discrete channel where it mixes with flow from Silver Creek in a wetlands area below the main embankment (RMC, 2003). Near the northwestern comer of the wetlands area, Silver Creek flows into the wetland beneath the rail trail bridge. Water flow exits the wetlands area back into Silver Creek via a concrete box culvert under State Highway 248 (RMC, 2003).

Silver Creek

Silver Creek flows approximately 500 feet from the main embankment along the west edge of the Site. The headwaters of Silver Creek are comprised of three significant drainages in the Upper Silver Creek Watershed; the Ontario Canyon, the Empire Canyon and Deer Valley. Flows from Ontario and Empire Canyons occur in the late spring to early summer months in response to snowmelt and rainfall, while Deer Valley flows appear to be perennial and originate from snowmelt and springs (RMC, 2000b). The largest contributor to water flow in Silver Creek near the Site is the Pace-Homer (Dority Springs) Ditch, which derives most of its flow from ground water (USEPA, 2001). The outflow from the Pace-Homer Ditch enters Silver Creek at several locations below the Prospector Square area. Significant riparian zones and wetlands exist near the Site in areas that consist of accumulated tailings piles.

5.2.2 Hydrogeology

Ground water of concern at the Site occurs in shallow aquifers below the original ground surface.

These aquifers are primarily fed from local surface water recharge and are small and local in nature. They generally flow from southeast to northwest toward Silver Creek. Below these shallow aquifers, at varying depths, lies the bedrock aquifer of the Keetley Volcanics, which contains varying amounts of ground water depending upon local conditions. The hydraulic gradient in all aquifers is generally upward, but the connection between the bedrock aquifer and the shallow aquifers is weak.

The Site is located in a low gradient valley surrounded by small hills. The erosion and weathering of these hills, also part of the Keetley Volcanics, formed the original soil surface upon which the tailings were placed, as well as the soils used to cover the impoundment after its closure. These soils are rich in clay and exhibit a very low permeability, making them very important to the ground water and surface water hydrology of the Site. Beneath the tailings, the original ground surface acts as a confining unit for ground water movement, preventing water in the tailings from infiltrating downward into the shallow aquifers, as well as preventing water in the shallow aquifers from moving upward into the tailings. On the surface, the soils used to cover the tailings function as a nearly impenetrable cap, effectively preventing infiltration of surface water into the tailings. The tailings are effectively encapsulated above and below by low permeability, clay rich soil. At present, the surface of the impoundment is convex and forms a closed basin, so precipitation that falls directly on the impoundment remains there until it evaporates or is used by plants. Spring snow melt and heavy rains cause a large, temporary area of ponded water on the east side of the impoundment. This ponded area remains for a significant duration after snow melt, with little recharge from precipitation, which shows the effectiveness of the cover soil in preventing significant infiltration into the tailings. The very small amount of

water that does infiltrate into the tailings eventually seeps through the main embankment into a small wetland.

The diversion ditch is also critical to the Site's hydrology. The diversion ditch serves as a barrier to both surface water and shallow ground water and captures water that flows toward the impoundment. The captured water is channeled around the impoundment, through a small retention pond, and into the small wetland at the foot of the main embankment. Here it mixes with water from Silver Creek and the small amount of water seeping through the embankment. All of this water is eventually used by plants in the wetland or flows north away from the Site as surface water or shallow ground water in the alluvium of Silver Creek.

5.3 SAMPLING STRATEGY

Sampling events for the RI took place in 2001 and 2002. The RI was designed to augment existing data that were collected in previous Site investigations and to collect additional data for the Ecological Risk Assessment. During these events each media was sampled as a separate entity. Samples were collected from the various site media, including surface water, ground water, Area A and B tailings, Area A and 8 soil cover, and lastly, sediments in the south diversion ditch and wetlands area.

Surface and Ground Water Sources

Surface water

Sample locations were chosen to provide sufficient data to characterize seasonal water quality and quantity in the South Diversion ditch and the two unnamed drainages flowing into the South Diversion Ditch, and Silver Creek. Data were also collected to determine the effects of the Site on Silver Creek and the metal concentrations in the surface water of the South Diversion Ditch. When sampling was not limited due to lack of flow, data was collected monthly at each location through one complete seasonal time period. All dissolved metal concentration data were screened against Utah Water Quality Standards. The most stringent of these standards are the Class 3A Aquatic Wildlife Chronic Criteria (AWCC). These standards are dependent on hardness and are adjusted appropriately for an average hardness measured at each sample location.

Ground water

Due to the amount of historic ground water data, additional data collection required the addition of two new monitoring wells which were installed adjacent to Silver Creek up and down gradient of the Site. These were established to determine any shallow alluvial groundwater impacts caused by the tailings. Samples were also taken from established wells close to the South Diversion ditch to determine the metals concentrations within the ground water associated with the Area 8 tailings, and to determine the hydraulic gradient

Tailings

Area A

Three test pits were created within Area A to sample the tailings. The test pits allowed for observation and documentation of the physical characteristics and spatial configuration of the interface. Additionally, at each location, five discrete samples were collected at one foot vertical

increments to a depth of five feet below the soil cover. Acid/base potential data was used to assess the geochemical characteristics of the tailings materials.

Area B

Sampling in this area was completed first to determine the extent of the tailings outside of the main impoundment. The sample data were used in combination with areal photographs and historical information to determine the study area boundary. Backhoe test pits (63 total) and a series of hand tool excavations were completed in order to gather analytical and visual samples. Visual samples were used to establish the location of the tailings/clay layer interface. This sample data was also used to assess the thickness of the soil cover on top of the tailings in Area B. Analytical data was used to confirm the visual data. At seven sample locations one sample was taken from the tailings and one sample was taken from the clay layer below the tailings.

Soil cover

Area A

Soil samples (41 samples total, 0-2" each) were collected for analysis. The holes were dug down until tailings were collected from below the main impoundment soil cover to determine the depth of the soil cover and the chemistry of the surface soils. Samples were analyzed for lead and arsenic while 20% of the samples were analyzed for RCRA metals plus copper and zinc.

Area B

The same excavation and hand tool sampling techniques that were described in the Area B tailings section were used to determine soil cover thickness in this area. Additionally, this area was sampled to assess the extent and impact of windblown tailings. A series of samples were collected from three transects (28 total) and analyzed for lead and arsenic.

South Diversion Ditch Sediments

Six locations were chosen for sediment sample collection. Data were used to identify the source of zinc loading to the surface water found in the diversion ditch and to evaluate ecological risk.

Background Soils

Background sm face soil samples (0-2") were collected from areas that have not been affected by tailings, found at least a mile away from the Site in all directions. All samples were analyzed for lead and arsenic, while 2 samples were analyzed for RCRA metals plus copper and zinc.

Study Area Boundary

Study area boundary samples were collected from two areas south of the tailings found outside the impoundment, and on the west and east perimeter of the main impoundment. These samples analyzed for lead and arsenic to aid in determining the study area boundary.

Ecological Sampling

Additional sampling was necessary to facilitate the completion of a thorough ecological risk assessment. Surface water and sediment sample data were collected from locations in the wetland area, site pond, and South Diversion Ditch. Vegetation samples and fish and macroinvertebrate samples were also taken. An analysis of these samples was necessary to complete the ecological risk assessment.

5.4 KNOWN AND SUSPECTED SOURCES OF CONTAMINATION

As previously described, the Silver Creek watershed is contaminated with heavy metals resulting from years of heavy mining activity in the Park City District. Surface water from the Site enters Silver Creek after passing through a wetland area in the northwest corner of the Site. There are three main sources of contamination at the Site: (1) the tailings contained within the tailings impoundment (Area A), (2) the tailings south of the diversion ditch (Area B) and (3) the tailings within the wetland area.

Metal contamination resulting from wind blown tailings distribution was investigated. Soil samples were taken along three transects (running west to east) that were oriented perpendicular to the prevailing wind direction. One transect was located north of the impoundment while the remaining two were located south of the impoundment. These samples were collected to determine the extent of wind blown tailings contamination and to aid in the study area boundary determination. The samples were analyzed for arsenic and lead and for eight RCRA metals, including zinc. Samples taken along transect two (south of the impoundment) had higher concentrations of lead than transects one and three. It is possible that these sample locations were not covered with top soil, while the other sample locations were. Sample locations with the highest concentrations of lead are included in the study area boundary.

5.5 TYPES OF CONTAMINATION AND AFFECTED MEDIA

The Site is contaminated with heavy metals, primarily zinc, lead and arsenic which are associated with the tailings found in the three locations described in Section 5.4. The media that are affected by these metals include the sediments and surface water of the south diversion ditch, the site wetland, and Silver Creek.

Surface water

Conclusions drawn from the sample data show that zinc exceeds the water quality criteria in some parts of the South Diversion Ditch, however, surface water zinc concentrations are be)ow the criteria where the diversion ditch meets the wetland area. A Comparison of surface water data collected from Silver Creek to the AWCC shows that zinc exceeds the criteria at both sample locations. Peak concentrations of zinc appear during spring run-off conditions.

Ground water

Data gathered from the monitoring wells were used to determine the metals concentrations within the ground water associated with the Area B tailings, and to determine the hydraulic gradient. After data gathered from these two areas were compared to Primary and Secondary Drinking Water Standards (PDWS and SDWS) and Treatment Technology Requirement (TTR) they were a)so compared to each other to determine whether the Site tailings are contributing zinc or other metals to the Silver Creek alluvial aquifer. Results show that ground water within the Area B tailings had lower concentrations of metals than the Silver Creek alluvial aquifer. Dissolved zinc concentrations from the Area B tailings are approximately 500 times lower than the zinc concentrations measured in the up gradient Silver Creek alluvial aquifer. Lastly, there is no hydraulic connection between ground water stored in the Area A tailings and the underlying aquifers.

Tailings Metals Concentrations

Area A

The average lead concentration in the Area A tailings was 4,530 ppm, while the average arsenic value was 265 ppm.

Area B

The average lead and arsenic concentrations in the tailings above the clay layer were 10,434 ppm and 412 ppm respectively, while the average lead and arsenic concentrations in the clay layer below the tailings were 52 ppm and 9 ppm. Average lead and arsenic concentrations in the clay layer below the tailings in Area B are well below the background soil concentration.

Area A and B tailings data analysis Based on the data presented above it appears that there are higher metals concentrations in the tailings in Area B as compared to Area A. However, metal concentrations in the clay layer below the tailings in Area B are lower than in background soil concentrations. Furthermore, the composition of the clay layer below Area B tailings is the same as the composition of the clay layer below the main impoundment. This lead to the conclusion that the clay layer below the tailings is serving as an adequate barrier to metals migration in Area B and A.

Soil Cover

Area A

Sample data indicate that the range of thickness of the soil cover is 0.5 to 4 feet. Analytical results show the average lead concentration to be 385 ppm, while the average arsenic concentration was 22 ppm. As there are no regulatory criteria for metals in soils, this data was used to analyze the risk of surficial soil exposure to recreational users and ecological receptors at the Site.

Area B

A series of samples were collected from three transects (28 total) and analyzed for lead and arsenic. Five of the samples were analyzed for eight RCRA metals plus zinc and copper. In conclusion, Transect 2 had a higher average concentration of lead and arsenic (1,446 ppm Pb, 75 ppm As) than transects 1 and 3, however, samples taken from this area may not have been covered by soil, causing the results to represent concentrations of lead and arsenic associated with the tailings that were already there, rather than concentrations associated with windblown tailings.

South Diversion Ditch Sediments

Analytical results show that the average concentrations for lead, arsenic and zinc are 2,578 ppm, 138 ppm and 7,878 ppm respectively. Concentrations are highest in the sample location found in the lower portion of the diversion ditch just east of the site pond.

Background Soils

The average lead concentration for the background soils is 43.3 ppm. The average arsenic concentration is 9 ppm. None of the background soil samples had elevated metals concentrations.

Study Area Boundary
Study area boundary samples were collected from two areas south of the tailings found outside the impoundment, and on the west and east perimeter of the main impoundment. These were analyzed for lead and arsenic to aid in determining the study area boundary. Analytical sample results were used to delineate the Study area Boundary. The boundary is drawn where background lead concentrations appear in the sample results.

Ecological Sampling
Additional sampling was necessary to facilitate the completion of a thorough ecological risk assessment. Surface water and sediment sample data was collected from locations in the wetland area, Site pond, and South Diversion Ditch. Vegetation samples and fish and macroinvertebrate samples were also taken. The resulting data was used to determine risk to ecological receptors in the Site area. A summary of the Ecological Risk Assessment including the findings from the ecological sampling is presented in section 7.2.

5.6 LOCATION OF CONTAMINATION AND POTENTIAL ROUTES OF MIGRATION

5.6.1 Surface water and Sediments

Sediments and surface water impacted by the tailings in Area A and B are found in the South Diversion Ditch and in the Wetland area. The contamination in these media is potentially affecting ecological receptors found in the area. Importantly, metal concentrations in the surface water of Silver Creek are lower than metals concentrations found in the surface water of the diversion ditch. Therefore, contaminated surface water found within the wetland is not adversely affecting Silver Creek.

South Diversion Ditch
Elevated concentrations of lead, arsenic, zinc and some cadmium were found in al) water and sediment samples taken. The South Diversion Ditch is a dynamic environment, where elevated concentrations of metals, particularly zinc, fluctuate with seasonal runoff and correspond with peak groundwater elevation. Likely sources of elevated metals concentration found in surface water and sediments in the Diversion Ditch include the tailings located in the bottom if the ditch, the small pond area south of the Site, or from the tailings in Areas A or B.

Wetlands
Although concentrations of metals in the surface water and sediment of the wetland area are lower than those of the South Diversion Ditch, they are very likely to have impacts on the ecological environment at the Site. The average concentrations of lead, arsenic and zinc are just below those in the South Diversion Ditch. There is a mixing of surface waters that occurs in the wetland area; while water from Silver Creek enters the northern portion of the wetland, surface water also flows in from the Diversion Ditch in the southern portion of the wetland. Sample results indicate that water entering the wetland area from Silver Creek contains higher metals concentrations than the surface water of the South Diversion Ditch.

5.6.2 Ground water

- Ground water sampling results indicate that the Site ground water has much lower concentrations of metals than the ground water within the Silver Creek alluvial ground water. A large amount of this ground water is captured in the South Diversion Ditch. Based on this data, it does not appear that the Site ground water is impacting the Silver Creek alluvial aquifer.
- As a result of the native clay layer found beneath the Area A tailings there is no hydraulic connection between the ground water associated with these tailings and the shallow alluvial aquifers or the underlying Keetley Volcanic aquifers.
- Sample results from ground water within the wetland area indicate that there are no significant impacts from the contamination found in the wet)and, the embankment or the Area A tailings.

5.6.2 Soils

In the previous sections on Background Soils and Soil Cover (Section 5.5) it is made clear that impacts to the soils at the Site are minimal. Most contamination is in the form of tailings that were deposited within Area A and in some small areas within Area B. Migration of metals away from these small areas within Area B is extremely limited. Most of the small tailings deposits within Area B have been previously covered with topsoil. Amy soils within Area B that have high concentrations of metals are included in the Study Area Boundary are addressed by the selected remedy.

SECTION 6

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

This section describes the current and reasonably anticipated future land uses and current and potential beneficial ground and surface water uses at the Site.

Current Land Use

The Site is located in a rural area within a broad valley of mostly undeveloped rangeland within the Silver Creek Watershed, approximately two mites outside the Park City limits. The Deer Valley and Park City ski resorts sit at the top of the watershed and serve as recreational use areas for skiers in the winter and bikers/hikers in the warmer months. As Silver Creek passes through Park City and into the surrounding suburban areas, the land use is primarily residential and commercial, changing to recreational and agricultural in the areas surrounding Richardson Flat. Most of the land around the Site is undeveloped open space.

Mining activities at the Site ceased in 1982. Since that time, the Site has not been used and has remained open space. A small recreational trail skirts the Site along Silver Creek. There are a few small industrial operations in the vicinity of the Site, including a concrete plant on a nearby parcel. Park City and other resort-like residential developments are expanding in the general area, but none are closer than one mile away.

Reasonably Anticipated Future Land Use

The Site, and much of the surrounding area, is privately owned by UPCM. UPCM has consistently indicated a desire to retain title and limit future use to recreational activities at the Site. While no final decision has been made, uses that range from open space wildlife habitat to athletic fields are currently being discussed. Any type of recreational use is consistent with surrounding land uses, and both Park City and Summit County have indicated general agreement with recreational proposals. Park City is proactive in obtaining and preserving open space. There is no indication that higher uses of the land, such as residential, are reasonably foreseeable.

Ground and Surface Water Uses

The surface water features at the Site, including the south diversion ditch, the wetlands area below the embankment, the Site pond and Silver Creek are used as habitat by a limited number of vegetative species, fish, and wildlife. All of the surface water and shallow ground water on the Site eventually discharges to Silver Creek. Silver Creek is classified by the State of Utah as a potential drinking water source, a recreational use feature, a cold water fishery, and a potential irrigation source. At present, Silver Creek is used for irrigation and recreational fishing only, and no changes are expected. The State of Utah is considering issuing an advisory against fishing due to elevated metal levels in Silver Creek. Silver Creek is listed on the State's Clean Water Act

Section 303(d) list of impaired water bodies because zinc and cadmium levels exceed chronic standards for protection of aquatic wildlife.

Silver Creek has been impacted by the legacy of mining activities, though the remedial investigation confirmed that the Site is not, at present, a significant contributor of metals to the creek. The goal is to remediate the entire watershed, improving the ecological quality of the area, thereby allowing for continued beneficial use of the watershed and the Site by a variety of living organisms.

Ground water in the immediate area is used only for private wells, and no wells are known to be located within a half mile of the Site. Most area drinking water wells are finished in the deeper consolidated sedimentary rocks that can sustain aquifers and produce sufficient yields for culinary wells. In the Site area, these formations are very deep and are covered by the Keetley volcanics. The volcanic rocks are generally not suitable to sustain aquifers and serve as more of a confining unit. The shallow ground water at the Site is generally associated with the alluvial system of Silver Creek. This water is very high in solids and is also often contaminated due to water quality in Silver Creek and tailings that are present along the Creek in many areas. There are no known uses for this water at this time.

SECTION 7

SUMMARY OF SITE RISKS

A baseline human health risk assessment (BHHRA) and a baseline ecological risk assessment (BERA) were performed to evaluate the potential for adverse human health and ecological effects that might occur from exposure to Site-related contaminants. Current and future risks were estimated for the baseline scenario (i.e., risks that might exist if no remediation or institutional controls were applied). The BHHRA and the BERA aided in drafting the remediation goals by providing a basis for taking action at the Site. The Chemicals of Concern and the exposure pathways were also identified through these risk assessments.

7.1 HUMAN HEALTH RISK ASSESSMENT

7.1.1 Identification of Chemicals of Concern

The BHHRA identified two contaminants, lead and arsenic, as chemicals of potential concern (COPC's) at the Site through a four step selection process. Risks to human health posed by exposure to these chemicals have been studied extensively through risk assessments completed at other Superfund sites in Utah and throughout the country. Currently, the Site has a soil cover that has a depth of 4 feet in some areas. Because of this soil cover, exposure pathways to these COPC s are limited or interrupted. However, if the integrity of this soil cover were threatened in any way by forces of nature or human intervention, the exposure pathways could become complete. Because of the high human health risk associated with lead and arsenic, and because of the potential exposure to recreational Site visitors if a remedy were not in place, lead and arsenic were selected as chemicals of concern (COC's) and risk drivers for the Site. The COC's are summarized in Tables 7-1,7-2, and 7-3.

7.1.2 Exposure Assessment

The exposure assessment identifies scenarios through which people could be affected by the COCs in Site media and estimates the extent of exposure Site users could endure. The conceptual site model illustrates the media and exposure pathways that were evaluated in the BHHRA (Figure 5). Media selected for evaluation in the B were soil/tailings, surface water, sediment, and air particulates. Because land use will be limited to recreational visitors, two separate recreational use scenarios were considered. An evaluation of the exposure pathways is also presented in Figure 6.

Low intensity User

The first scenario includes low intensity users, such as hikers, bikers and picnickers, ranging in age from young children to adults. Exposure pathways evaluated were ingestion of soil/tailings, surface water and sediment, dermal exposure to surface water and inhalation of particulates in air.

High Intensity User
Scenario two includes high intensity users such as horseback riders, ATV users, dirt bikers and team sports players. High intensity users were assumed to exclude younger children and include teenagers and adults. The exposure pathways a high intensity user may be subjected to include ingestion of soil/tailings and inhalation of particulates in air.

7.1.3 Toxicity Assessment

The purpose of the toxicity assessment is to review and summarize the potential for each COC to cause adverse effects in exposed individuals. The toxic effects of a chemical generally depend on the inherent toxicity of a chemical, the route of exposure (ingestion, inhalation, and dermal), and the duration of exposure (subchronic, chronic or lifetime).

There is a positive relationship between dose (chemical intake through an exposure pathway), and adverse effect, so as dose increases the type and severity of adverse response also increases. Chemical toxicological information derived from either animal or human studies is used to estimate toxicity criteria which are numerical expressions between dose (exposure) and response (adverse health effects). Toxicity criteria are developed for the assessment of carcinogenic and non-carcinogenic health effects. Toxicity criteria include the EPA online Integrated Risk Information System (IRIS) and EPA's Health Effects Assessment Summary Tables (HEAST).

Toxicity criteria for carcinogens are provided as cancer slope factors (CSF's) in units of risk per milligram of chemical per kilogram of body weight per day (mg/kg day). CSF's are based on the assumption that no threshold exists for carcinogenic effects and that any dose is associated with some finite carcinogenic risk. The chemical-specific CSF is multiplied by the estimated chemical intake to provide an upper-bound estimate of the increased likelihood of cancer resulting from exposure to the chemical. This risk would be in addition to any background risk of developing cancer over a lifetime due to other causes. Consequently, the risk estimates in the BHHRA are referred to as incremental or excess lifetime cancer risks. Based on data from IRIS and other published data, arsenic is classified as a known human carcinogen (EPA weight of Evidence A). Tab)e 7-4 shows the cancer toxicity criteria for ingestion of arsenic. Lead toxicity is evaluated using other methodologies such as the Integrated Exposure Uptake Biokinetic (IEUBK) model. Estimated blood lead levels are compared to target blood-lead concentrations to assess possible risks.

Toxicity criteria for noncarcinogens are provided as reference doses (RfDs) and represent the daily exposure to a chemical that would be without adverse effects, even if the exposure occurred continuously over a lifetime. The RfD is provided in units of milligrams per kilogram per day (mg/kg4ay) for comparison with chemical intake into the body. Chemical intakes that are less than the RfD are not likely to be of concern even to sensitive individuals. Chemical intakes that are greater than the RfD indicate a possibility for adverse effects. Noncancer toxicity values for COCs for ingestion/dermal exposures are presented in Table 7-5.

EPA has not published toxicity criteria for lead. This is because available data suggest that there is no threshold for adverse effects even at exposure levels that might be considered background. Any significant increase in exposure above background levels could represent a cause for

concern. Instead of evaluating risk using typical intake calculations and toxicity criteria, EPA has developed other methodologies for evaluating lead exposures. One such methodology is the Integrated Exposure Uptake Biokinetic (IEUBK) model, a computer model used to predict blood-lead levels in children exposed to lead from a variety of sources, including soil, dust, ground water, air, diet, lead-based paint, and maternal blood. Estimated blood-lead levels are compared to target blood-lead concentrations to assess possible risks. The IEUBK model is intended for use only for children up to the age of seven, as these are the most sensitive receptors to lead exposure, The model assumes daily exposure in a residential setting.

There are circumstances in which adjustments to toxicity criteria should be made to account for the relative bioavailability of a chemical due to its chemical form or its reactive form or the particular medium in which it is found. The issue of bioavailability is especially important when dealing with media from mining sites because metals in these media may exist in insoluble media. These chemical and physical properties may tend to influence (usually decrease) the adsorption or bioavailability of the metals when ingested. Because no site specific data are available for the bioavailability of arsenic in soils/tailings the default value of 0.8 was applied to the arsenic toxicity criteria.

Adverse Effects of Arsenic Exposure

Noncancer Effects

Oral exposure to acute and chronic ingestion of lower levels of arsenic often include diarrhea, vomiting, decreased blood cell formation, injury to blood vessels, damage to kidney and liver, and impaired nerve 5mction. The most diagnostic sign. of chronic arsenic exposure is an unusual pattern of skin abnormalities, including dark and white spots and a pattern of small "corns," especially on the palms and soles (ATSDR 1991).

Carcinogenic Effects

There have been a number of epidemiological studies in humans which indicate that chronic inhalation exposure to arsenic is associated with increased risk of lung cancer (USEPA 1984, ATSDR 1991). In addition, there is strong evidence from a number of human studies that oral exposure to arsenic increases the risk of skin cancer (USEPA 1984, ATSDR 1991). The most common type of cancer is squamous cell carcinoma, which appears to develop from some skin corns. Although the evidence is limited, there are some reports which indicate that chronic oral arsenic exposure may also increase risk of internal cancers, including cancer of the liver, bladder and lung, and that inhalation exposure may also increase risk of gastrointestinal, renal or bladder cancers (ATSDR 1991).

Adverse Effects of Lead Exposure

Noncancer Effects

Excess exposure to lead can result in a wide variety of adverse effects in humans. Chronic low-level exposure is usually of greater concern for young children than older children or adults. The effect of lead that is usually considered to be of greatest concern in children is impairment of the nervous system. The effects of chronic low-level exposure on the nervous system are subtle and normally cannot be detected in individuals, but only in studies of groups of children. Common measurement endpoints include various types of tests of intelligence, attention span, hand-eye coordination, etc. Such effects on the nervous system are long-lasting and may be permanent.

Additionally, studies in animals reveal that high blood lead levels during pregnancy can cause fetotoxic and teratogenic effects. Further, a characteristic effect of chronic high lead exposure is anemia stemming from lead-induced inhibition of heme synthesis and a decrease in red blood cell life span.

Cancer Effects
Studies in animals indicate that chronic oral exposure to very high doses of lead salts may cause an increased frequency of tumors of the kidney (USEPA 1989b, ACGIH 1995). However, there is only limited evidence suggesting that lead may be carcinogenic in humans, and the noncarcinogenic effects on the nervous system are usually considered to be the most important and sensitive endpoints of lead toxicity (USEPA 1988).

7.1.4 Risk Characterization

The BHHRA characterized the risk to low and high intensity recreational users through exposure to the COCs at the Site.

7.1.4.1 Evaluation of Carcinogenic Risk

For carcinogens, risks are generally expressed as the probability of an individual developing cancer over a lifetime as a result of exposure to the Site-related contaminants. This is described as "excess lifetime cancer risk" because it is an addition to the risk of cancer from other causes. Exposure to Site COPCs was evaluated by multiplying chemical specific exposure estimates (i.e. average lifetime dose) by the chemical and route specific CSF. The result was a unitless measure of probability (e.g., 1E-4) of an individual developing cancer as e result of chemical exposures at the Site. A cancer risk of 1E-04 refers to an increased chance of one in ten thousand of developing cancer as a result of site related exposure to a carcinogen over the expected duration. Typically, the USEPA considers remedial action at a site when estimated total excess cancer risk to any current or future population exceeds the range between one in ten thousand (1E-04) and one in a million (1E-06). Estimated carcinogenic risks for reasonable maximum exposure (RME) scenarios are presented in tables 7-6 and 7-7. Estimates of average risks are presented in the BHHRA.

Low Intensity Users
RME excess cancer risks were calculated for potential low intensity recreational users, which include hikers, bikers and picnickers. Risks were evaluated for the ingestion, inhalation and dermal exposure pathways. Risk from inhalation and ingestion of sediments, soil/tailings and surface water and dermal exposure to surface water were estimated to fall below EPA's threshold cancer risk of 1E-06. Risk from ingestion of soil/tailings was estimated to be 2E-05 for the RME scenario. This risk falls into EPA's acceptable range of 1E-04 and 1E-06.

High Intensity Users
RME excess cancer risks were calculated for high intensity recreational users which include horseback riders, ATV users, dirt-bikers, and sports (soccer, baseball) players. Risks were evaluated for the ingestion of soil/tailings and the inhalation of soil as dust exposure pathways, Risk from inhalation of soil as dust was estimated to fall well below the threshold cancer risk of

1E-06. Risk from ingestion of soil/tailings was estimated to be 1.1E-05, which falls into EPA's acceptable range of 1E-04 and 1E-06.

7.1.4.2 Evaluation of Noncarcinogenic risks

The potential for noncarcinogenic effects due to exposure to a particular chemical is expressed as the hazard quotient (HQ). An HQ was calculated by dividing the dose (estimated chemical intake) of a chemical by the RfD. The HQ calculation assumes that there is a threshold level of exposure below which no adverse effects will occur. An HQ less than one indicates that there is little potential for adverse noncancer effects, even in sensitive individuals, while an Hg greater than one indicates the potential for adverse noncancer effects. The hazard index (HI) is equal to the sum of all the HQs. A HI less than one indicates there is little potential for adverse effect from exposure to all COCs at a site. An HI greater than one indicates the potential for adverse noncancer effects from exposure to all COCs, assuming that all chemicals have the same toxic effect and that toxic effects would be additive. Estimated RME noncancer hazards for populations evaluated in the BRA are presented in Tables 7-8 and 7-9. Please refer to the BHHRA for estimates of average noncancer hazards across the Site.

Low Intensity Users
Noncancer hazards were quantified for exposure to arsenic via ingestion of soils/tailings, surface water and sediment. The risk associated with inhalation of soil as dust and dermal contact with surface water was also considered. The HI was the sum of all HQs associated with the Site for the low intensity user. The RME HI was 9.2E-02 related to arsenic exposure through the various pathways. This falls below EPA's acceptable range for exposure to non-carcinogenic contaminants, which means that it is not a human health concezn by BPA's standards

High Intensity Users
Noncancer hazards were quantified for exposure to arsenic via ingestion of soils/tailings, and inhalation of soil as dust for the high intensity recreational user. The HI, the sum of the HQs, HI was 5.8E-02, which falls below EPA's acceptable range for exposure to non-careinogenic contaminants, which means that it is not a human health concem by EPA's standards

7.1.4.3 Evaluation of Risks from Lead

Risks from lead are usually evaluated by estimation of the blood levels in exposed individuals and compared to blood lead levels within an appropriate health based guideline. The USEPA and CDC have set a goal that there should be no more than a 5% chance that a child should have a blood level over 10 μg/dL. The BHHRA used the IEUBK model to first evaluate risks to a hypothetical nearby resident of a child's age (0-6 years). Second, risks to a residential child engaged in low-intensity recreational activities at the Site were evaluated. The risk to residential children engaged in recreational activity is higher than the risk to children who live nearby but don't engage in recreational activity. However, the geometric mean values are relatively low, and children engaging in recreational activities have less than a 5% chance of exceeding a blood lead level of 10 μg/dL.

Risks for exposure to lead in Site media were also evaluated for teenage and adult recreational visitors using the Bowers model. Low and high intensity recreational visitor exposure scenarios were examined. Results showed that high or low-intensity recreational use at this Site is not predicted to cause high blood lead levels which exceed a target concentration of 11.1 µg/dL. The 11.1 µg/dL standard is a health criterion based on the blood lead concentration that is acceptable for a pregnant adult.

7.1.5 Assessment of Uncertainties

Several assumptions used in the evaluation of lead risks at this Site may introduce uncertainty into the presented findings. Although in most cases, assumptions employed in the risk assessment process to deal with uncertainties are intentionally conservative; that is, they are more likely to lead to an overestimate rather than an underestimate of risk, it is nevertheless important to take these uncertainties into account when interpreting the risk conclusions derived for this Site. Uncertainties presented in the risk assessment include: uncertainty in lead concentrations estimates, uncertainty in lead absorption from soil, and uncertainty in the modeling approach.

Uncertainty in Lead Concentration Estimates

Evaluation of human health risk at any particular location requires accurate information on the average concentration level of a COPC at that location. Because estimating the mean is more difficult when aggregating data over a large exposure area, such as the Site, the true mean could be underestimated. Here, the 95th Upper Confidence Limit soil lead concentration was used to evaluate risks from lead. This approach is reasonable for use at the Site where lead concentrations in onsite soil/tailing materials range from 14 to 5,875 mg/kg. This conservative approach for estimating exposure to lead at the site may *overestimate* the acted risks from lead for the Site, ensuring that all of the risk estimates are more likely to be high than low.

Risks from exposure to lead were evaluated based on surficial soil data. This decision was based on the assumptions that recreational users are most likely to be exposed to surficial soils based on their activities. Based on the depth distribution observed for lead, risks from exposure to subsurface soils will be similar or less than those observed for surface soils. However, if concentrations for lead are ever found to increase as a function of depth, the risks based on surface soil exposure will *underestimate* risks for those individuals exposed to buried materials. The maximum lead concentration in soil/tailings observed at the Site at any depth is 21,380 mg/kg.

Uncertainty in Lead Absorption from Soil

Another important source of uncertainty regarding the risk from lead in soil is the degree of absorption (RBA) within the gastrointestinal tract. For the risk assessment performed at the Site, a default relative bioavailability factor for lead of 0.60 has been applied. This introduces uncertainty, and causes either an over or underestimation of risk because the selected value is not based on actual measurements for site soils. Soils are complex by nature and may have numerous attributes which influence overall absorptions characteristics.

Uncertainty in Modeling Approach

All predictive models, including the IEUBK model and the ISE model, are subject to a number of limitations. First, there is inherent difficulty in providing the models with reliable estimates of human exposure to lead-contaminated media. For example, exposure to soil and dust is difficult to quantify because human intake of these media is likely to be highly variable, and it is very difficult to derive accurate measurements of actual intake rates. Second, it is often difficult to obtain reliable estimates of key pharmacokinetic parameters in humans (e.g., absorption fraction, distribution and clearance rates), since direct observations in humans are limited. Finally, the absorption, distribution and clearance of lead in the human body is an extremely complicated process, and any mathematical model intended to simulate the actual processes is likely to be an over-simplification. Consequently, model calculations and predictions are generally rather uncertain.

The Bowers model used to assess lead exposures in youths and adults requires a composite toxicokinetic parameter (the biokinetic slope factor) to predict the effect of exposure on blood lead levels. This value is derived mainly from studies in adult males, and it is not certain that the value is accurate for youths or for women (especially pregnant women). Also, the exposures being modeled with the Bowers model are intermittent rather than continuous, so blood lead levels in the exposed populations are expected to show temporal variability. Toxicity data are not adequate to estimate the level of health risk associated with occasional (rather than continuous) elevations im blood lead level due to intermittent exposures to elevated lead levels in the environment. However, since the observed lead levels in soil/tailings result in predicted blood lead levels that are well below the established level of concern, these uncertainties in the modeling approach do not cast serious doubt on the accuracy of the conclusion that lead levels at this Site are not of concern to older children or adults.

7.2 ECOLOGICAL RISK ASSESSMENT

Tailings released to the environment from ore milling operations generally contain metals that can, depending on the concentration and level of exposure, be toxic to ecological receptors. In accord with the eight-step process recommended by USEPA for evaluating ecological risks the ecological risk assessment process at this Site was initiated by performing a Screening-Level Ecological Risk Assessment (SLERA) (USEPA, 2003a), which was followed by the Baseline Ecological Risk Assessment (BERA, January, 2004). These ecological risk assessments were completed to describe the likelihood, nature, and extent of adverse effects to ecological receptors resulting from present and potential exposure to the COCs at the Site. The SLERA was intended to provide a preliminary evaluation of the potential for adverse effects to three classes of ecological receptors (aquatic, terrestrial, wildlife). Because a SLERA normally uses a number of simplifying assumptions and approaches and is intentionally conservative, the SLERA was not intended to support any final quantitative conclusions about the magnitude of the potential ecological risks. The SLERA was also used to identify additional data that needed to be gathered in order to complete the BERA. Once the additional data was compiled it became possible to perform a more complete risk assessment, addressing the COC's and the risks posed through the various ecological exposure pathways within the exposure areas of the Site. The BERA was conducted using the problem formulation approach, which is an iterative process that allows risk

assessors to refine the assessment as new information becomes available and to make qualitative conclusions about Site risks by using a weight of evidence evaluation. The various methods used to assess exposure and risk under the problem formulation approach as well as a description of the combined results of the SLERA and the BERA are described in the sections that follow.

7.2.1 Identification of Chemicals of Concern

Chemicals of concern (COCs) at the Site were identified through a weight of evidence evaluation that began in the SLERA. In this process, the maximum concentration of each detected metal was compared to the screening level benchmark (SL) for that metal. If this concentration was greater than the SL, the chemical was considered a chemical of potential concern (COPC) and was retained for further evaluation in the BERA. Additionally, the Site was divided into exposure areas for the purpose of the risk assessment. These areas are based on the Site characteristics and include Silver Creek (upstream and downstream), Site diversion ditches, the wetlands area, Site pond, and Area A and Area B tailings. By examining the ecological receptors and the COPCs associated with the environmental media within each exposure area, a risk management decision was made to determine the COCs for the Site. As a result of this approach, the following COCs are described based on the environmental media and the ecological receptor associated with that media. Cadmium and zinc (dissolved) were the COCs identified for surface water and aquatic receptors at the Site. Within the bulk sediment, cadmium, copper, mercury and zinc were considered COCs if benthic organisms were the receptors. Lead associated with the sediment was found to be a COC if waterfowl were the ecological receptors. The COCs, arsenic and zinc (dissolved), associated with sediment porewater could be toxic to benthic organisms. Lastly, aluminum, lead, mercury and zinc were named COCs and considered toxic to plants and soil invertebrates in contact with the soils and tailings at the Site. The COCs are summarized in Tables 7-10 through 7-14. These COC's have the potential to adversely affect growth, diversity, reproduction and survival of the various species that populate the Site.

7.2.2 Exposure Assessment

When examining exposure to ecological receptors at the Site it is important to note that in accordance with the State of Utah surface water code, the Weber River from the Stoddard diversion to its headwaters (including Silver Creek) is classified as a cold water fishery (3A) and is protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in the food chain. Because the Site provides possible habitat for fish, aquatic invertebrates, terrestrial plants, terrestrial invertebrates, mammals, birds, reptiles and amphibians, those were the receptors included in the SLERA.

Figure 7 presents the ecological conceptual site model (CSM) for the Site. As indicated in the Ecological CSM, ecological receptors that may be exposed at the Site include aquatic receptors (fish and benthic macroinvertebrates), amphibians and reptiles, terrestrial receptors (plants and soil invertebrates), and wildlife receptors (birds and mammals). Each receptor class may be exposed to chemical contamination via contact with one or more environmental media, including surface water, sediment, seeps, aquatic food items, soil/tailings, and terrestrial food items. However, not all of these exposure pathways are likely to be of equal concern. Pathways that were supported by adequate data became the primary focus of the BERA and were included in

the quantitative risk evaluation. An explanation of the elimination of certain pathways can be found in the BERA and for the purposes of this ROD, only the pathways of high ecological concern are described below.

Aquatic Receptors (Fish)

The main pathways of exposure for fish and benthic invertebrates are direct contact with surface water and sediment. Each of these pathways were evaluated quantitatively.

Terrestrial Receptors (Plants and Invertebrates)

The primary exposure pathway for both terrestrial plants and soil invertebrates is direct contact with contaminated soils. This pathway was evaluated in the SLERA; however, additional data were not collected for the BERA, so further analysis of this pathway was not conducted. It is assumed from the SLERA that direct contact with contaminated soils is a complete pathway and one of potentially high risk to terrestrial receptors.

Wildlife Receptors (Birds and Mammals)

Birds and mammals may be exposed by ingestion of food web items (either from the terrestrial environment and/or from the aquatic environment). Wildlife receptors may also ingest soil or sediment during feeding, especially for soil- or sediment-dwelling prey items. Although these exposure pathways are complete and of potential concern (USEPA, 2003a), no new data are available for contaminant concentrations in soil or in terrestrial food items, and it is expected that remedial actions planned for the site will largely address potential risks to terrestrial (upland) wildlife receptors from exposures to contaminants on the main impoundment and in off impoundment areas (RMC, 2003). Therefore, quantitative risk characterization for the BERA focused on exposures of aquatic/semi-aquatic wildlife receptors in the wetlands area, and risks to upland terrestrial wildlife receptors were not re-evaluated in the BERA.

7.2.3 Ecological Effects Assessment

Assessment and measurement endpoints are part of the problem formulation approach used to examine ecological risk at the Site. Again, the problem formulation method is an approach to risk assessment that is designed to provide risk managers with adequate qualitative and quantitative information. As a result, risk managers can make decisions that lead to protection of the ecological environment.

Assessment endpoints are explicit statements of the characteristics of the ecological system that are to be protected. Assessment endpoints are either measured directly or are evaluated through indirect measures. Measurement endpoints represent quantifiable ecological characteristics that can be measured, interpreted, and related to the valued ecological components chosen as the assessment endpoints (USEPA 1992, 1997).

Table 7-15 presents the assessment and measurement endpoints used to interpret potential ecological risks for the Site that were evaluated in the BERA. These measurement endpoints can

be divided into three basic categories: (1) hazard quotients (HQs), (2) site-specific toxicity tests, and (3) observations of population and community demographics.

Hazard Quotients

Hazard Quotients (HQ's) are generally used by the EPA to determine whether remedial action is warranted. For example, in human health risk assessment for non-carcinogenic effects, remedial action is warranted if the HQ for a COC is greater than 1 for a particular site user. However, for the purposes of the BERA, HQs were used as one part of the weight-of-evidence evaluation along with the other factors including toxicity testing and population observations. A HQ is the ratio of the estimated exposure of a receptor at the Site to a "benchmark" exposure that is believed to be without significant risk of unacceptable adverse effect:

HQ = Exposure / Benchmark

Exposure may be expressed in a variety of ways, including:

- Concentration in an environmental medium (water, sediment, soil, diet)
- Concentration in the tissues of an exposed receptor
- Amount of chemical ingested by a receptor

In all cases, the benchmark toxicity value must be of the same type as the exposure estimate.

If the value of an HQ is less than or equal to 1, risk of unacceptable adverse effects in the exposed individual is judged to be acceptable. If the HQ exceeds 1, the risk of adverse effect in the exposed individual is of potential concern.

When interpreting HQ results for ecological receptors, it is important to remember that the assessment endpoint is usually based on the sustainability of exposed populations, and risks to some individuals in a population may be acceptable if the population is expected to remain healthy and stable. In these cases, population risk is best characterized by quantifying the fraction of all individuals that have HQ values greater than 1 and by the magnitude of the exceedances. In interpreting HQ values and distributions of HQ values, it is always important to bear in mind that the values are predictions, and are subject to the uncertainties that are inherent in both the estimates of exposure and the estimates of toxicity benchmarks. Therefore, HQ values should be interpreted as estimates rather than highly precise values and should be viewed as part of the weight-of-evidence along with the results of site-specific toxicity testing and direct observations on the structure and function of the aquatic community (see below).

Site-Specific Toxicity Tests

Site-specific toxicity tests measure the response of receptors that are exposed to Site media. This may be done either in the field or in the laboratory using media collected on the site. The chief advantage of this approach is that site-specific conditions which can influence toxicity are usually accounted for. A potential disadvantage is that, if toxic effects once when test organisms are exposed to a Site medium, it is usually not possible to specify which chemical or

combination of chemicals is responsible for the effect. Rather, the results of the toxicity testing reflect the combined effect of the mixture of chemicals present in the Site medium. In addition, it is often difficult to test the full range of environmental conditions which may occur at the Site across time and space, either in the field or in the laboratory, so these studies are not always adequate to identify the boundary between exposures that are acceptable and those that are not.

Population and Community Demographic Observations

A third approach for evaluating impacts of environmental contamination on ecological receptors is to make direct observations on the receptors in the field, seeking to determine whether any receptor population has unusual numbers of individuals (either lower or higher than expected), or whether the diversity (number of different species) of a particular category of receptors (e.g., plants, benthic organisms, small mammals, birds) is different than expected. The chief advantage of this approach is that direct observation of community status does not require making the numerous assumptions and estimates needed in the HQ approach. However, there are also a number of important limitations to this approach. The most important of these is that both the abundance and diversity of an ecological population depend on many site-specific factors (habitat suitability, availability of food, predator pressure, natural population cycles, meteorological conditions, etc.), and it is often difficult to know what the expected (non-impacted) abundance and diversity of an ecological population should be in a particular area. This problem is generally approached by seeking an appropriate "reference area" (either the site itself before the impact occurred, or some similar site that has not been impacted), and comparing the observed abundance and diversity in the reference area to that for the site.

7.2.4 Risk Characterization

As noted above, each of the measurement endpoints has advantages but also has limitations. For this reason, conclusions based on only one method of evaluation may be misleading. Therefore, the best approach for deriving reliable conclusions is to combine the findings across all of the methods for which data are available, taking the relative strengths and weaknesses of each method into account. If the methods all yield similar conclusions, confidence in the conclusion is greatly increased. If different methods yield different conclusions, a careful review must be performed to identify the basis of the discrepancy and to decide which approach provides the most reliable information.

Risk to Aquatic Receptors

As discussed above, aquatic receptors (fish, benthic invertebrates) may be exposed to Site contaminants in surface water and sediment at a number of exposure areas including Silver Creek, the south diversion ditch, the wetlands area, Site pond, and an unnamed drainage which flows into the south diversion ditch. Evaluation of potential risks by the HQ approach, site-specific toxicity testing, and population surveys are summarized below.

Risk to Aquatic Receptors		
Exposure Pathway	**Line of Evidence**	**Findings**
Direct Contact with Surface Water	Estimated HQs from measured surface water concentrations	Surface water concentrations of cadmium and zinc in Silver Creek are probably adversely impacting aquatic receptors. Zinc may also be of concern to aquatic receptors in the Site diversion ditch and wetlands area. Concentrations of several metals may be above a chronic level of concern in the unnamed drainage which flows into the Site diversion ditch.
Direct Contact with Sediment	Estimated HQs from measured bulk sediment concentrations	Wide-spread, and potentially severe, toxicity to benthic invertebrates may be occurring in Silver Creek, the site diversion ditch, the wetlands area, and the site pond due to multiple metals in bulk sediment.
	Estimated HQs from measured sediment porewater concentrations	Sediment porewater concentrations of arsenic and zinc (antimony, cadmium and lead to a lesser extent) in the wetlands area, especially in the northern portion of the wetlands, may be of concern to benthic invertebrates.
	Sediment toxicity tests (*Hyalella azteca*)	Statistically significant decreases in survival were seem for 5 of 8 stations in the wetlands area. 100% mortality was seen in 3 sampling stations located in the northern part of the wetlands area.
All exposure pathways combined	Tissue burden evaluation	Measured tissue levels of zinc suggest that benthic invertebrates and snails in the wetlands area may be adversely impacted due to site exposures. Fish in the Site pond may also be adversely impacted based on the elevated tissue levels of aluminum, lead, and zinc.
	Aquatic community evaluation	No recent data are available.

Weight of evidence conclusions
Based on these lines of evidence, metals in the wetlands area and the Site diversion ditch are probably having an adverse effect en aquatic receptors (fish and aquatic invertebrates). Antimony, arsenic, cadmium, lead, and zinc found in sediment, sediment porewater or surface water may adversely impact the aquatic receptors in the exposure areas mentioned above.

For Silver Creek, dissolved metals (especially cadmium and zinc) are likely to pose a significant risk to aquatic receptors. Because risks are elevated in surface water collected upstream of the Site, it is evident that sources in addition to the Site contribute to the toxicity. The headwaters of

Silver Creek originate in the mountains south of Park City, a location that is influenced by several historic mining operations such as the Little Bell and My Mines. According to the findings of the Upper Silver Creek watershed evaluation (USEPA, 2001a), the Silver Maple Claims (Pace-Horner Ditch) was the largest contributor of zinc for the lower reaches of Silver Creek. Zinc loads from the Site south diversion ditch are reported to contribute only 0.03 lbs/day to Silver Creek (USEPA, 2001a). Based on this information, it appears that the Site is currently only a minor contributor to the current level of metal contamination in Silver Creek. However, if the metals present in sediments and/or surface water are reduced in Silver Creek as a result of off site clean up activities, it may be possible that discharges from the Site could recontaminate these media and become a more dominant influence on metal loading in the future.

Risk to Wildlife Receptors

The SLERA evaluated risks to terrestrial and aquatic/semi-aquatic wildlife and concluded that ingestion exposures from most media were potentially above a level of concern. Because no new data are available for contaminant levels in soils or terrestrial food web items, and because it is expected remedial activities will address concerns over soil-related pathways, terrestrial (upland) wildlife exposures were not re-evaluated. New data for surface water, sediment, and aquatic food web items were gathered, therefore, exposures of aquatic/semi-aquatic wildlife from these pathways were quantitatively evaluated as described below.

Selection of representative species
It is not feasible to evaluate exposures and risks for each aquatic/semi-aquatic avian and mammalian species potentially present at the Site. For this reason, several species were selected to serve as representative species (surrogates) of several different semi-aquatic feeding guilds. Selection criteria for representative wildlife species include trophic level, feeding habits, and the availability of life history information. Representative wildlife receptors selected for the Site include:

Wildlife Receptors and Exposure Pathways Evaluated		
Feeding Guild	**Representative Species**	**Exposure Pathways Evaluated**
Mammalian piscivore	Mink	Ingestion of surface water, sediment, and fish
Avian piscivore	Belted Kingfisher	
Avian omnivore	Mallard Duck	Ingestion of surface water, sediment, aquatic invertebrates, and aquatic plants
Avian insectivore	Cliff Swallow	Ingestion of surface water, sediment, and emerging aquatic insects

Weight of evidence conclusions
Based on the estimated HQs and Hazard Indexes (HIs) from ingested dose, it was concluded that incidental ingestion of lead, manganese and zinc in sediments from the wetlands area, the south

diversion ditch, and Site pond are likely to be causing adverse effects in waterfowl and other birds which feed in these areas. Concentrations of lead, and possibly zinc and manganese, in aquatic food items may also cause adverse effects in birds that consume fish, aquatic invertebrates, or aquatic plants from the Site

Risk to Wildlife Receptors		
Exposure Pathway	**Line of Evidence**	**Findings**
Ingestion of surface water, sediment, and aquatic food items	Estimated HQs and HIs from ingested dose (calculated from measured data)	Risks to birds are likely to be of potential concern in the wetlands, diversion ditch, and pond, primarily from lead in sediment and also from these lead in aquatic food items. Risks to the cliff swallow may be above a level of concern from manganese and zinc in aquatic invertebrates and sediment. However, correlation of manganese in sediment compared to manganese in invertebrates is inconsistent, so predicted risks may not be site-related or may reflect an overly conservative TRV.

7.2.5 Ecological Cleanup Levels

A review of the lines of evidence and numerical calculations presented in the BERA suggests that lead is a clear driver of ecological risk at the RFT Site. HIs for incidental ingestion of lead in sediment by wildlife receptors (primarily waterfowl) are generally higher than those for other COCs, pathways, and receptors. In this regard, lead can be used to establish a cleanup standard that is conservative. Rather than establishing cleanup levels for all COCs, a cleanup level that is protective relative to incidental ingestion of lead in sediment by wildlife is considered sufficiently protective of other COCs, pathways, and receptors.

EPA selected an ecological cleanup level of 310 ppm lead in, sediment. This value is based on a low-end threshold Toxicity Reference Value (TRV) from the species sensitivity distribution (SSD) for all birds, and hence it is likely to be the most appropriate value to ensure protection of all waterfowl. This approach assumes that the variability in TRVs between different species of waterfowl is similar to the variability for other types of birds. While there is considerable uncertainty, it is expected that attainment of this numerical level would reduce HI's for lead in sediment to less than one.

7.2.6 Uncertainties

Quantitative evaluation of ecological risks is generally limited by uncertainty regarding a number of important data. This lack of knowledge is usually circumvented by making estimates

based on whatever limited data are available, or by making assumptions based on professional judgment when no reliable data are available. Because of these assumptions and estimates, the results of the risk calculations are themselves uncertain, and it is important for risk managers and the public to keep this in mind when interpreting the results of a risk assessment. Uncertainties related to the BERA are summarized in Table 7-16.

7.3 HUMAN HEALTH AND ECOLOGICAL RISK CONCLUSIONS

The BHHRA, which is based on present conditions at the Site, determined there are currently no unacceptable risks from lead and arsenic to the targeted use population (recreational visitors) at the Site. However, remedial action is necessary to maintain and improve the soil cover that was placed on the tailings. Disturbances to the present soil cover could allow for exposure to the underlying tailings.

There is substantial risk to ecological receptors at the Site from exposure to zinc, cadmium, lead and arsenic found in the various environmental media at the Site. Exposure pathways include direct contact with the sediments within the South Diversion Ditch and the wetlands area. These exposure areas also present risks to ecological receptors through contact or ingestion of surface water and sediment porewater found at the Site.

SECTION 8

REMEDIAL ACTION OBJECTIVES

8.1 NEED FOR REMEDIAL ACTION

The measures undertaken voluntarily by UPCM over the past two decades have significantly reduced the risks presented by contaminants at the Site. These measures, while incomplete, have effectively isolated most of the contaminated materials from the environment and generally made the Site safe for recreational use. However, the ecological risks identified and described in the previous sections, along with the physical conditions present at the Site, necessitate additional remedial action. In its current state, the Site presents unacceptable risks to aquatic wildlife receptors, both in the wetland below the embankment and in the south diversion ditch. Similarly, the Site's physical characteristics create the potential for significant migration of heavy metals off the Site and into Silver Creek, as well as the potential for future exposure to recreational users. The Remedial Action Objectives (RAOs) for the Site focus on mitigating existing ecological risks and maintaining or improving the physical conditions to prevent or minimize future releases and exposures.

8.2 REMEDIAL ACTION OBJECTIVES

To address the existing and potential risks, as well as accommodate the anticipated future recreational and ecological use of the Site, EPA has developed nine RAOs:

1. Reduce risks to wildlife receptors in the wetland area and south diversion ditch such that hazard indexes for lead are less than or equal to one.
2. Ensure that recreational users, including children, continue to have no more than a 5% chance of exceeding a blood lead level of 10 micrograms per deciliter from exposure to lead in soils
3. Ensure that recreational users, including children, continue to have no more than 1×10^{-4} chance of contracting cancer from exposure to arsenic in soils.
4. Eliminate the risk of catastrophic failure of the tailings impoundment.
5. Ensure that surface water discharged from the Site meets applicable Utah water quality standards.
6. Eliminate the possibility of future ground water use and withdrawal at the Site.
7. Allow for a variety of future recreational uses.
8. Allow for future disposal of mine tailings from the Park City area within the tailings impoundment until the remedy is complete.
9. Minimize post-cleanup disturbance of tailings and contaminated soil. Provide controls that ensure any necessary disturbance at the Site follows prescribed methods.

SECTION 9

DESCRIPTION OF ALTERNATIVES

In the FFS, four specific alternatives for remedial action, as well as a No Action alternative, were brought forward for detailed analysis. These alternatives are described in the subsections below.

9.1 DESCRIPTION OF REMEDY COMPONENTS

9.1.1 Alternative 1- No Action

It is a requirement of CERCLA and the NCP that the EPA evaluate the consequences of taking no action at the Site. This alternative is designed to establish a baseline of current conditions upon which other alternatives cen be compared. Alternative 1 does not provide any additional protection of human health or the environment.

9.1.2 Alternative 2- Soil Cover, Institutional Control and Wedge Buttress

Alternative 2 entails increasing the depth of cover over tailings in the Study Area, implementing institutional controls to manage human contact with Site materials, and installing a wedge buttress to a portion of the main embankment of the tailings impoundment. The South Diversion Ditch and wetland areas will be left undisturbed.

Major Components

- All tailings are left in current location
- Existing soil cover is augmented to achieve a depth of at least 18 inches of soil above tailings both inside and outside the impoundment
- Embankment is fortified to prevent catastrophic failure
- Institutional controls (easements and land use restrictions) to protect soil cover and prevent ground water use
- Ongoing surface water monitoring
- Mine waste from the Park City area will be placed inside the impoundment before the soil cover is augmented.

9.1.3 Alternative 3- Source Removal, Soil Cover and Wedge Buttress

Alternative 3 includes source removal and covering of Area B tailings, placing clean soil over the tailings impoundment, installation of a wedge buttress, covering of contaminated sediments in the diversion ditch, removing contaminated sediments in the wetland, and placing of restrictions on future land and groundwater use.

Major Components

- Tailings in critical areas outside the impoundment (Area B) are excavated and moved inside the impoundment
- Existing soil cover is augmented to achieve a depth of at least 18 inches of soil above tailings
- Sediments in diversion ditch are covered with clean gravel
- Contaminated sediments and soils in the wetland below the embankment are excavated and material is placed within the impoundment
- Mine waste from the Park City area is placed within the impoundment during implementation of the remedy
- Embankment is fortified to prevent catastrophic failure
- Institutional controls (easements and land use restrictions) to protect soil cover and prevent ground water use
- Ongoing surface water monitoring

9.1.4 Alternative 4- Excavation, Treatment and Offsite Disposal

This alternative entails excavating the contaminated material from the impoundment and from an area south of the diversion ditch, stabilizing it onsite, and disposing of it in a non-hazardous waste (Subtitle D) or hazardous waste (Subtitle C) landfill. Following treatment, the material would be tested using Toxicity Characteristic Leaching Procedure (TCLP) methods and disposed of in the proper landfill depending on its classification as either hazardous or non-hazardous waste. Once treatment and disposal processes are complete the site would be reclaimed by grading the area, applying six inches of topsoil and seeding the new soil with a native mix.

Major Components

- All tailings are excavated
- Tailings treated on-site through stabilization process to limit release of metals
- Tailings disposed of at off-site landfill

9.1.5 Alternative 5- Excavation, Treatment and Onsite Disposal

This alternative would include excavating the contaminated material from the impoundment and south of the diversion ditch and stabilizing it in a temporary treatment facility located adjacent to the impoundment. The treated materials would then be disposed of in a repository space within the impoundment. Upon completion of treatment and disposal activities the impoundment would be reclaimed. The Site will be graded to prevent surface water accumulation, thus reducing infiltration. Following the remedial activities, 18 inches of soil will be applied, including 12 inches of a low permeability soil and 6 inches of top soil. The top soil will be seeded with a native mix.

Major Components

- All tailings are excavated
- Tailings treated on-site through stabilization process to limit release of metals
- Tailings replaced into impoundrnent and covered with 18 inches of soil
- Institutional controls (easements and land use restrictions) to protect soil cover and prevent ground water use
- Ongoing surface water monitoring

9.2 COMMON ELEMENTS AND DISTINGUISHING FEATURES OF EACH ALTERNATIVE

Alternatives 1, 2, and 3 all involve managing the tailings in place to varying degrees, with altematives 2 and 3 adding increased levels of response. The RI has shown that the existing soil cover and the Site's hydrogeologic setting have effectively isolated the tailings from the environment, so it is clear that each of these altematives, even the No Action Alternative, will be effective to some degree. This type of managed repository for low-toxicity mine wastes is standard industry practice and can be considered a presumptive remedy. The design requirements for all alternatives are small and the time to implement each alternative is no more than two years.

Alternative 3 is distinguished from Alternative 2 by the increased protectiveness and risk reduction achieved by (1) excavating wastes in critical areas outside the impoundment, and (2) covering the diversion ditch sediments with gravel. Both alternatives 2 and 3 provide the opportunity for placement of mine waste from other locations in the Upper Silver Creek Watershed at the Site.

Alternatives 4 and 5 both involve excavation and treatment of all contaminated materials. These alternatives add additional protectiveness and limit future maintenance and management requirements such as monitoring. The design requirements for these alternatives are larger, involve significant bench and pilot testing, and the time to implement these alternatives are in excess of five years. Alternative 5 is distinguished from Alternative 4 in that treated wastes will remain on-site, as opposed to being disposed of in an off site landfill.

9.3 EXPECTED OUTCOMES OF EACH ALTERNATIVE

Alternative 1 - No Action

- Immediately safe for recreational use
- Ecological risks not addressed
- Potential for increased future releases and exposures, including catastrophic failure of embankment
- No additional improvements in water quality
- Potential for unacceptable future ground water exposures

Alternative 2 - Soil Cover, Institutional Controls and Wedge Buttress

- Ready for recreational use in approximately two years
- Ecological risks not addressed
- Potential for catastrophic failure of embankment eliminated
- Site could be used for disposal of mine waste from other locations in the Watershed during implementation of the remedy
- Limited additional improvements in water quality
- Future ground water use restricted and potential for future exposures eliminated
- Ongoing monitoring and management required

Alternative 3 - Source Removal, Soil Cover and Wedge Buttress

- Ready for recreational use in approximately two years
- Ecological risks mitigated
- Potential for catastrophic failure of embankment eliminated
- Site could be used for disposal of mine waste from other locations in the Watershed during implementation of the remedy
- Significant improvements in water quality
- Future ground water use restricted and potential for future exposures eliminated
- Ongoing monitoring and management required

Alternative 4 - Excavation, Treatment and Offsite Disposal

- Ready for unlimited use no sooner than five years
- Ecological risks mitigated
- Potential for catastrophic failure of embankment eliminated
- Significant improvements in water quality
- Potential for future ground water exposures eliminated
- No future Site management or monitoring

Alternative 5 - Excavation, Treatment and Onsite Disposal

- Ultimate land-use potential unknown, but no use sooner than five years
- Ecological risks mitigated
- Potential for catastrophic failure of embankment eliminated
- Significant improvements in water quality
- Potential for future ground water exposures likely eliminated
- Limited Site management and monitoring required

SECTON 10

SUMMARY OF COMPARATIVE ANALYSIS

The NCP sets forth nine criteria for use in a detailed, comparative analysis of alternatives. This section summarizes the detailed analysis found in the FFS with specific discussion for each criterion followed by a summary and ranking table (10-1, 10-2).

10.1 QUALITATIVE EVALUATION OF EACH CRITERION

Overall Protection of Human Health and the Environment

This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled.

Alternatives 1 and 2 do not provide adequate protection of human health and the environment. Neither alternative addresses risks posed by contaminated sediments in the diversion ditch and wetland areas. Alternative 1 also does not improve physical conditions at the Site, making future releases and exposures likely.

Alternatives 3, 4, and 5 all provide adequate protection of human health and the environment. Alternative 3 addresses risks posed by contaminated sediments in the diversion ditch and wetland areas through a combination of source removal and containment. Alternatives 4 and 5 provide additional protectiveness through treatment of contaminated wastes and soils. Alternatives 3, 4, and 5 also improve physical conditions at the Site, minimizing or eliminating the potential for future releases. Alternative 3 accomplishes this with a wedge buttress, soil cover, and institutional controls to better contain the tailings. Alternatives 4 and 5 accomplish this primarily through treatment of contaminated wastes and soils.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP Section 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate federal and state requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified in a timely manner and that are more stringent than federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, they nonetheless address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well-suited to the particular site. Again, only those State standards that are identified in a timely manner and that are more stringent than Federal requirements may be relevant and appropriate.

Site ARAR's are summarized in Table 10-3. Alternatives 1 and 2 will not comply with all of the ARAR's, while alternatives 3, 4 and 5 will. Additionally, the Action Specific hazardous waste ARAR's dealing with federally-defined hazardous wastes under RCRA are not applicable to Bevill-exempt waste, but may be relevant and appropriate. The majority of the mine waste at Richardson, and most mining waste that is transported from other Park City mining areas is considered Bevill-exempt under federal exemptions. Therefore, the action specific ARAR's apply to any waste associated with the site that is not Bevill-exempt.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of the remedy to maintain reliable protection of human health and the environment over time, once cleanup levels are met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Due to UPCM's prior voluntary efforts, each alternative provides some degree of long-term protection, though Alternatives 1 and 2 do not adequately address all risks posed by the Site. Alternatives 2 and 3 improve upon Alternative 1 through the use of physical improvements and institutional controls to reduce the risk of future releases from the Site, with Alternative 3 including provisions that address the risks posed by the diversion ditch and wetlands. However, both these alternatives require on-going institutional controls and monitoring to ensure their continued efficacy. Alternatives 4 and 5 largely eliminate this concern through treatment of all contaminated wastes and soils.

Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Only Alternatives 4 and 5 contain provisions for active treatment. Both alternatives would reduce, though not eliminate, the toxicity and mobility of the contaminants through stabilization treatment technologies in a similar fashion. The technologies considered are proven for mine wastes, but their effectiveness varies from site to site based upon the physical characteristics of the waste. However, neither alternative would reduce the volume of material required to be managed, which may actually increase slightly due to the addition of necessary reagents.

Short-Term Effectiveness

Short-term effectiveness addresses the period of tune needed to implement the remedy and any adverse impacts that may be posed to the workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Each alternative can be implemented safely with proper engineering controls, though the degree of short-term risk varies considerably among the alternatives.

Alternatives 2 and 3 can be completed in a relatively short-time period of approximately two or three construction seasons. These alternatives involve only limited on-site earthmoving and any risks would be limited to workers and trespassers. These risks are easily controlled through institution of safe work practices and engineering controls.

Alternatives 4 and 5 would take substantially more time to complete - perhaps in excess of ten years. Both alternatives not only include more earthwork than Alternatives 2 and 3, but both also involve the operation of treatment systems and the use of slightly toxic reagents. These factors serve to increase the risk to workers. Alternative 4 also involves off-site transportation and disposal, which increases the risk to the community as waste is hauled via highway. Again, these risks could be managed, though not as easily, or likely as effectively, as those in Alternatives 2 and 3.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operations.

All of the alternatives involve technology that is relatively basic. Alternatives 2 and 3 involve only on-site earth moving, and all of the resources are available locally. Alternatives 4 and 5 are somewhat more difficult to implement due to the inclusion of treatment technologies. However, these technologies are well established, and all of the resources necessary for implementation are readily available.

Cost

The estimated present worth costs for the alternatives, not including Alternative 1, range from $2,295,398 for Alternative 2 to $343,234,058 for Alternative 5. Alternatives 4 and 5 both involve on-site treatment, are considerably more expensive than Alternatives 2 and 3, which do not involve treatment. Cost summaries are found in Tables 10-2.

State Acceptance

The UDEQ has expressed its support for Alternatives 3, 4, and 5. However, UDEQ also recognizes that Alternatives 4 and 5 are significantly more costly.

Community Acceptance

This criterion considers whether or not the local community agrees with EPA's analyses and preferred remedial alternative. Comments received on the Proposed Plan are important indicators of community acceptance. This is a balancing criterion.

During the Proposed Plan public comment period, one set of written comments was received that related to the transportation of waste from other areas within the Watershed to the Site. Specifically, the comments were directed to the chosen transportation route. Some comments on the preferred alternative were made by Utah Department of Fish and Wildlife and they are addressed in the Responsiveness Summary. All verbal questions raised at the public meeting were addressed at the meeting by EPA staff. A transcript of the meeting is available on the website and in the information repository.

10.2 SUMMARY AND RANKING TABLE

A comparison summary and the rankings are found in table 10-1 and 10-2.

SECTION 11

PRINCIPAL THREAT WASTE

The NCP establishes an expectation that EPA will use treatment to address principal threats posed by a site wherever practical. A principal threat concept is applied to the characterization of "source material" at a Superfund site, A source material is material that includes or contains hazardous substances or pollutants, or contaminants that act as a reservoir for migration of contamination to ground water, surface water, or air, or acts as a source for direct exposure. EPA has defined principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.

The waste at the Site is considered a high volume, low toxicity source material in that the risk levels at the Site under the current conditions are near or within the acceptable range. This is true for existing conditions, as well as for reasonably anticipated future recreational land uses. Similarly, past experience at similar mining-related sites has shown that low-toxicity mine wastes can be reliably contained. As such, though treatment was considered as an alternative, no materials at the Site were considered principle threat wastes.

SECTION 12
THE SELECTED REMEDY

12.1 SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

Several basic questions guide the development of the ROD and the ultimate selection of a remedy:

- What risks does the Site present?
- To what degree and how will those risks be mitigated?
- Which alternative best meets the nine remedy selection criteria set forth by the NCP?

EPA has considered these questions, as set forth in the previous sections of the ROD and in the supporting FFS, and has determined that Alternative 3, "Source Removal, Soil Cover and Wedge Buttress," is the selected remedy for the Site. Alternative 3 mitigates risks to a sufficient degree, meets all threshold standards and criteria, and has the best balance of tradeoffs with respect to balancing and modifying criteria. Alternatives 1 and 2 do not sufficiently mitigate risks and are not satisfactory candidates for a final remedy. Alternatives 4 and S sufficiently mitigate risks, meet all threshold standards and criteria, and offer increased protection of human health and the environment, but the costs of implementation are dramatically higher than Alternative 3. The greater costs are not justified by the relatively small improvements in overall protection of human health and the environment offered by Alternatives 4 and 5.

12.2 DETAILED DESCRIPTION OF THE SELECTED REMEDY

The selected remedy has several key components that are described in detail below:

Source Removal

Tailings and contaminated soils in Area B and in the wetland below the main embankment will be excavated and relocated to the low-lying area within the impoundment. The areas of concern will be over-excavated by 6 inches or to the depth required for removal of visible mine tailings and materials with lead concentrations greater than 310 ppm lead. Areas selected for excavation include: (1) contaminated materials in low-lying portions (subject to seasonal ponding or interaction with shallow ground water) of Area B, and (2) all of the sediments in the wetland below the impoundment. The wetland will not be excavated until upstream source areas along Silver Creek, specifically Empire Canyon, Silver Maple Claims, and the "flood plain" tailings just above the Site, are remediated. This is to ensure that clean areas are not re-contaminated, and is consistent with the overall cleanup plan for the Upper Silver Creek Watershed.

Soil Cover

A minimum 12 inch thick low permeability soil cover will be placed on all areas where tailings or contaminated materials are left in-place, including the impoundment. The cover will build

upon the existing soil cover and utilize similar materials. The cover would be placed in 6 inch lifts and compacted. Upon completion of the impermeable soil cover, 6 inches of topsoil cover will be added to provide for an 18 inch soil cover in total. The final surface would be graded to control surface storm water runoff and drainage and re-vegetated with a native seed mix to minimize erosion. Drainage swales and runoff channels may be installed where required to direct surface runoff toward the diversion ditch. Where applicable storm water runoff control structures will be constructed using erosion resistant materials such as geotextile fabric and rip-rap.

Wedge Buttress

A wedge buttress will be installed along the over-steepened portion of the embankment (for about 400 feet of the total embankment length of 800 feet). Fill will be placed along the toe of the embankment to a height of approximately 10 feet above the toe and extending horizontally out from the embankment face approximately 30 feet, or to other dimensions designed to provide an increase in stability of at least 50/o. Prior to construction, the upper soil and existing vegetation and organic matter will be removed. Drain material and a filter blanket (if required) will be placed prior to the buttress fill. Seep water currently emanating from the embankment will be diverted to the South Diversion Ditch. The buttress fill material will be compacted to at least 95% of the maximum dry density as determined by ASTM D-698 at moisture content within two (2) percent of optimum. At the end of construction the buttress fill will be protected from erosion by re-vegetation.

Sediment Cover

Clean gravel (12 inches) will be placed over sediments in the south diversion ditch.

Institutional Controls

Two primary institutional controls (ICs) will be implemented to mitigate potential risks and ensure the long-term efficacy of the remedy:

1. Ground water use restrictions within the Site boundary. The goal is to preclude any use of shallow ground water, as well as eliminate any significant alteration of the existing hydrogeologic system, such as mixing of aquifers. This IC will be in the form of a deed restriction and will be the responsibility of the owner of the Site,

2. Land use restrictions within the Site boundary. The goal is to preclude non-recreational uses and to ensure the soil cover, or similar protections, are maintained. This IC will be in the form of an Environmental Covenant and will be the responsibility of the owner of the Site.

Placement of Additional Mine Waste at the Site

There are several reasons why the Richardson Flat Site is an appropriate location for the placement and consolidation of mine wastes from cleanups conducted at other locations in the Watershed. First, the nature of the mine wastes found throughout the watershed is similar.

Second, the volume of waste from other locations is extremely small relative to the volume of wastes already present in the impoundment. The impacts from such a small contribution would be negligible. Lastly, the RI has shown that the mine tailings at the Site are well contained and present no unacceptable risks to human health. The selected remedy will ensure conditions remain this way and that all other Site risks are addressed. These factors make the Site an acceptable long term repository, and, in conjunction with these factors an off-site rule determination was made and agreed upon in date.

Monitoring

Water quality samples will be collected at the mouth of the diversion ditch quarterly for two years after construction completion to ensure discharges into Silver Creek meet applicable water quality standards.

12.3 SUMMARY OF THE ESTIMATED REMEDY COSTS

A summary of the selected remedy costs can be found in table 12-1. The present worth cost of this remedy is $3,675,868 and is presented in detail in table 12-2.

12.4 EXPECTED OUTCOMES OF THE SELECTED REMEDY

Land Use

The selected remedy allows for a variety of recreational uses. Such uses may include low intensity uses, such as open space, or more high-intensity uses such as athletic fields. Any construction/development activities occurring on the soil cover must be designed to maintain at least 18 inches of clean soil (12 inches of low permeability soil plus 6 inches of topsoil) between the tailings and the surface and minimize infiltration through the use of low-permeability clay or other engineering controls. Future changes in land use may be contemplated but would require a reassessment of risk.

In the short-term, the selected remedy allows for placement of mine wastes from other cleanup locations in the Watershed at the Site. This will reduce the cost to implement other cleanups (by eliminating the need to haul wastes to a landfill) and aid in the overall cleanup of the watershed. Only select locations in the impoundment (generally low spots that require fill) will be used for this purpose.

Ground Water and Surface Water Use

The selected remedy restricts ground water use only within the impoundment. This shallow ground water is very low in volume and of poor quality and will not be considered a potential drinking water source. Deeper ground water below and around the impoundment that may be considered a future drinking water source is not affected.

All surface water from the Site discharges to Silver Creek and is expected to be acceptable for all designated uses of the creek. No drinking water uses are expected.

Final Cleanup Levels and Residual Risk

Several media are affected at the Site, but the nature of the Site and the remedy mean that most cleanup decisions were based upon physical characteristics of the Site rather than media-specific concentrations of COCs:

- In surface water, discharges from the south diversion ditch are expected to be consistently below the appropriate water quality standards for protection of aquatic wildlife. For zinc, the most critical metal, this value is dependent upon water hardness, but is generally between 0.1 and 0.8 ppm. Water discharging from the Site is expected to continue to be of be5er quality than Silver Creek, and will create a net improvement in water quality downstream. Surface water conditions in the wetland are contingent upon upstream remediation activities and are impossible to predict at this time. No human health risk is associated with surface water from the Site.

- In sediments, all contaminated sediments are expected to be addressed. AR sediments in the diversion ditch will be covered with clean fill. All sediments in the wetland will be excavated and replaced with clean fill as necessary. Again, this is based upon the physical dimensions of these features, rather than on concentrations within the media. To ensure that all contaminated sediments are removed in the wetland, a remediation goal of 310 ppm lead was established. Soils will be over-excavated, and sampling will be conducted to ensure no sediments remain with concentrations of greater than 310 ppm lead. This is expected to bring all HI's for aquatic wildlife below one. It is impossible to predict eventual sediment concentrations as the system comes to equilibrium over time, but they are expected to be of equal quality or of improved quality than sediments in Silver Creek and protective of aquatic wildlife.

- In soils, all contamination (e.g. the entire impoundment and a few small areas outside of the impoundment) will be covered with at least eighteen inches of clean soil (12 inches of low permeability soil plus 6 inches of topsoil), so there should be no appreciable residual human health risk due to incidental exposure if the soil cover is maintained. As an additional measure, soils will be sampled and no soils with concentrations greater than 500 ppm lead will be left exposed. Such a level is far below any calculated remediation goals for recreational uses. Some risks will be associated with potential disturbance of buried tailings, but these are considered minimal and manageable with ICs.

- In ground water, only water within the impoundment is affected. This water is not expected to be used as a drinking water source, but IC's will prevent any exposure.

Socioeconomic Impacts

- No significant socioeconomic impacts are expected.

SECTION 13

STATUTORY DETERMINATIONS

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions to the extent practicable: In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off site disposal of untreated wastes. The following sections discuss how the selected remedy meets these statutory requirements.

13.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy ensures both short-term and long-term protection of human health and the environment in several ways:

Protection of Human Health

- The baseline human health risk assessment, as discussed in Section 7 of this ROD, shows that the Site, under current and reasonably anticipated future uses, presents no unacceptable risks to human health.

- Remedial actions wilt ensure that these conditions are not significantly altered in the future. The existing soil cover will be enhanced to ensure that the mine tailings do not migrate and that future exposure to mine tailings does not occur. The impoundment wall will be buttressed to ensure that no catastrophic failure occurs. Institutional controls will be established to ensure that only recreational uses are allowed, that ground water within the impoundment is not extracted, and that the sail cover remains intact.

- Implementation of the remedy is simple and straightforward, and engineering controls will be implemented to ensure that workers are protected.

Protection of the Environment

- The RI showed that surface water discharged from the Site currently meets the appropriate Utah Water Quality Standards for all metals. The Site is only a minor contributor to metal loading in Silver Creek. Remedial actions will ensure that metals discharged from the Site will be further reduced, helping to further enhance water quality in Silver Creek. Area 8 tailings, which apparently influence water quality in the diversion ditch, will be excavated and placed inside the impoundment. The impoundment will be graded to further reduce infiltration into tailings.

- The BERA, as discussed in Section 7 of this ROD, showed that contaminated sediments in the wetland and diversion ditch present unacceptable risks to aquatic receptors and wildlife. In the diversion ditch, the sediments will be covered with clean fill material, breaking the exposure pathway. In the wetland, which is a natural and critical habitat, the contaminated sediments in the entire wetland will be removed and the wet)and restored. These actions are expected to reduce risks to acceptable levels.
- Future land uses, all recreational in nature, are expected to largely preserve the habitat value the Site provides.
- Engineering controls will be established to ensure no cross-media contamination during implementation. Remedial actions will ensure no future migration of contamination, either within or between media. The existing Site conditions and enhanced soil cover will isolate and contain the tailings. The buttress on the impoundment will ensure no catastrophic failures and release occur. A well-ban will ensure no cross contamination of aquifers or discharge of contaminated water.

13.2 COMPLIANCE WITH APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy is compliant with all ARARs associated with the Site. Site ARARs are summarized in Table 10-1. The Action Specific hazardous waste ARAR's are not applicable to Bevill-exempt waste. The majority of the mine waste at Richardson, and any mine waste that is transported from other Park City mining areas to the Site most likely is or will be Bevill-exempt. Therefore, the action specific hazardous waste ARAR's apply to any waste associated with the site that is not Bevill-exempt.

13.3 COST EFFECTIVENESS

The NCP mandates that the selected remedy be cost-effective. It does not mandate that the most cost-effective alternative be selected, only that the alternative that is selected meets a few basic criteria for cost-effectiveness. The nature of the Site (high volume of waste, low toxicity waste, limited number of suitable cleanup technologies) makes this determination somewhat simple. The five alternatives evaluated can be broken down into three basic categories:

- No Action (Alternative 1)
- Containment-Based (Alternatives 2 and 3)
- Treatment-Based (Alternatives 4 and 5)

Alternatives 1 and 2 did not meet minimum standards for protectiveness, and hence cannot be considered cost effective. Alternatives 4 and 5, while adding increased protectiveness and satisfying the statutory preference for treatment, increase the costs relative to Alternative 3 up to two orders of magnitude – hundreds of millions of dollars. The relatively small increase in protectiveness for such a large cost increase is not warranted. Alternative 3 is somewhat more expensive than Alternative 2, but addresses all Site risks. It is simple to implement and the basic technology is consistently used for tailings pile closures. The overall effectiveness of Alternative

3 is clearly proportional to its overall effectiveness. Tables 13-1, 13-2, 13-3 and 13-4 summarize the costs of each alternative besides alternative 1, the No Action Alternative.

13.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT FOR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE (MEP)

The selected remedy represents the best balance of trade-offs among the alternatives evaluated. Because the waste at the Site is comprised of naturally occurring inorganic minerals and metals, it is impossible to completely rid it of toxicity through treatment. It cannot be burned or significantly altered. Because of this, some degree of containment must be contemplated for the materials whether they are treated or not – either on-site or off site containment. All of the alternatives, with the exception of the No Action alternative, include containment components, and are thus not fundamentally different in this regard. Alternatives 4 and 5, while they may be considered slightly more "permanent" than Alternative 3 because of the reduction in toxicity and use of a managed, off-site landfill, are far more costly to implement, Clearly, on-site containment is the most permanent solution that is practicable.

No resource recovery technologies are applicable for the Site. The tailings have already been processed for metal recovery during initial mining, and current economic conditions do not warrant further metal recovery at the very high cost such actions would require.

13.5 PREFERENCE FOR TREATMENT AS A PRINCIPLE ELEMENT

As stated in Section 11, there are no principle threat wastes present at the Site. The waste is high volume, low toxicity. As such, there is no waste that is particularly critical to treat. The waste can be treated, but the exceedingly high cost with relatively low reduction in toxicity is not warranted. Because of this, treatment is not a principle element of the selected remedy.

13.6 FIVE-YEAR REVIEW REQUIREMENTS

Because the selected remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure the remedy is, or will be, protective of human health and the environment. Such reviews will continue every five years indefinitely to ensure the remedy remains protective over time.

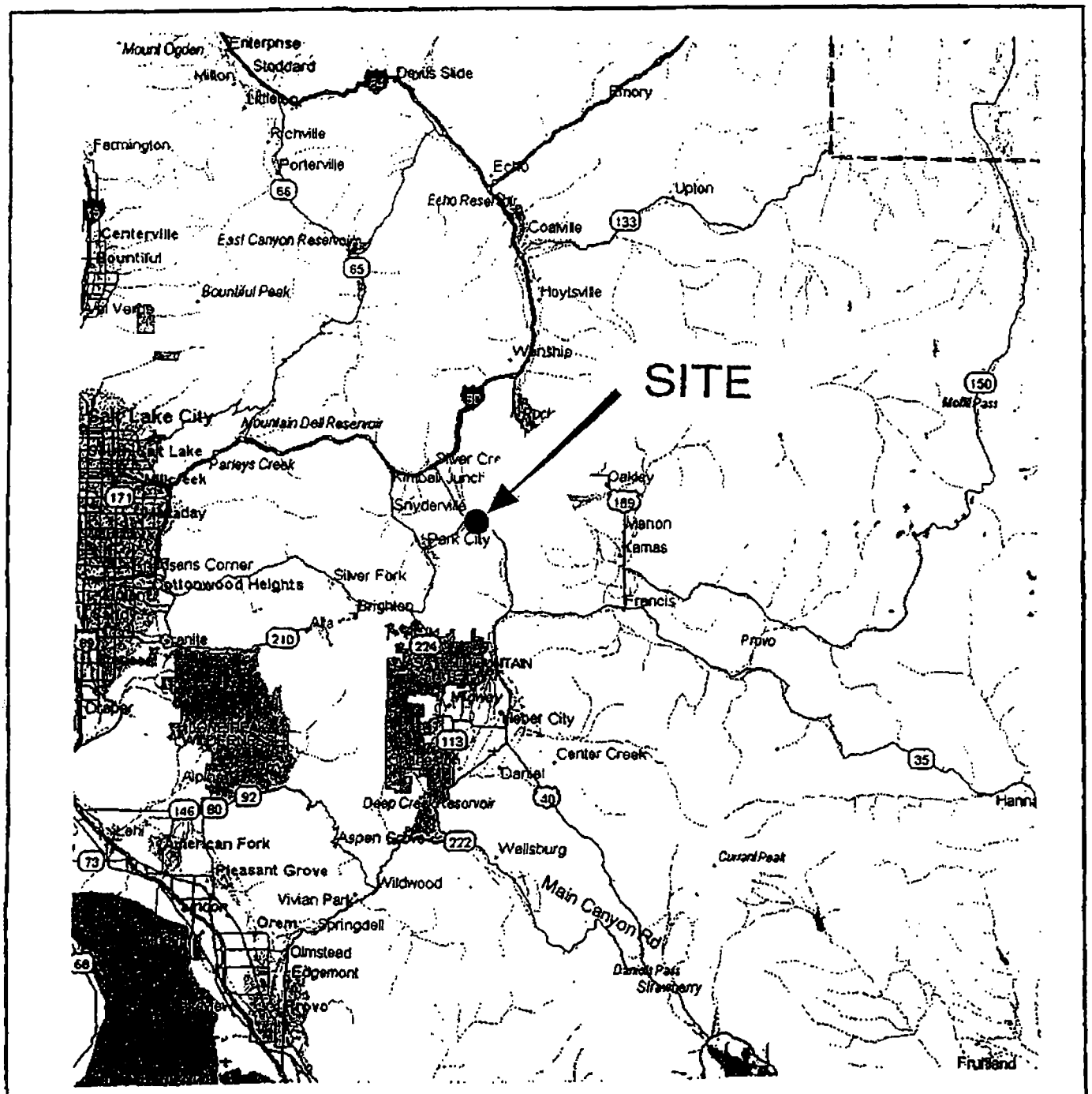
SECTION 14

DOCUMENTATION OF SIGNIFICANT CHANGES

The proposed plan was released for public comment in September of 2004. It identified as the preferred alternative the same alternative as the selected remedy identified in this ROD. This remedy includes removing small potions of tailings in Area B and disposing of them within the impoundment, installing a wedge buttress to support the main embankment, removal of sediments within the wetland area and finally capping the main impoundment. The preferred alternative did not change between the issuance of the proposed plan and the ROD.

APPENDIX A

FIGURES FOR THE RECORD OF DECISION



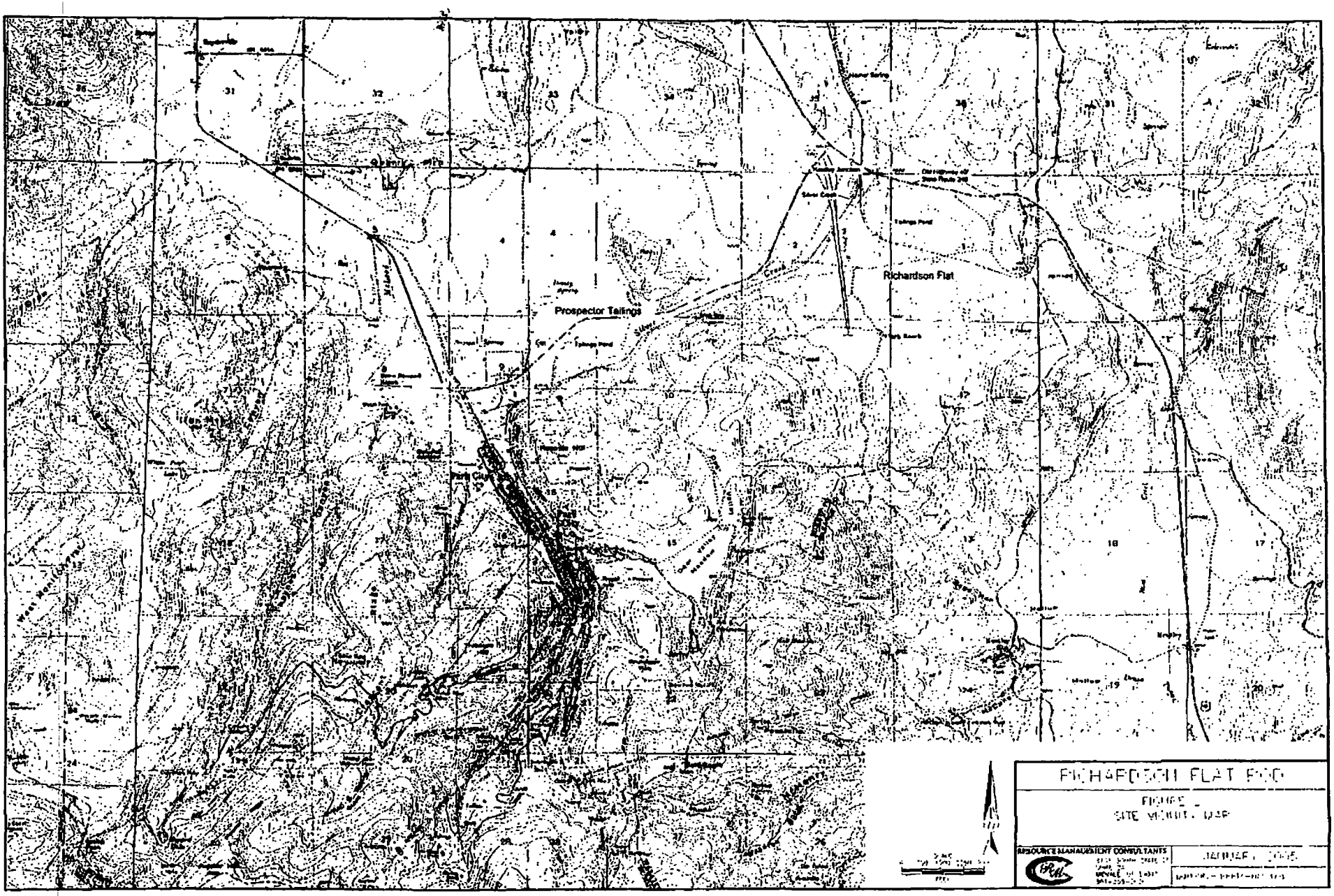
RICHARDSON FLAT RI

FIGURE 1
SITE LOCATION MAP

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

SEPTEMBER 2004

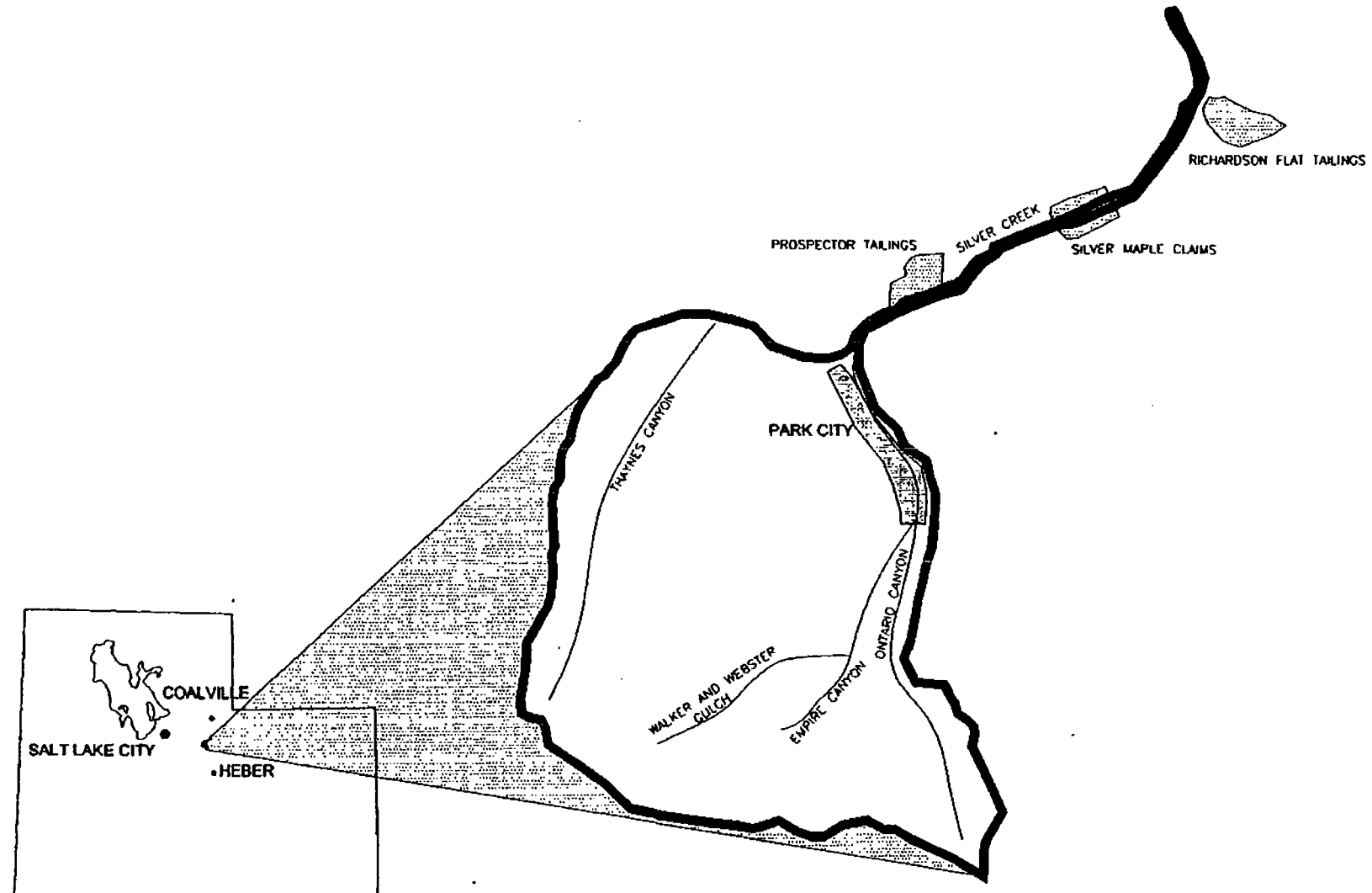
ri-site-location-map-dwg



RICHARDSON FLAT PAD

FIGURE -
SITE VICINITY MAP

RESOURCE MANAGEMENT CONSULTANTS



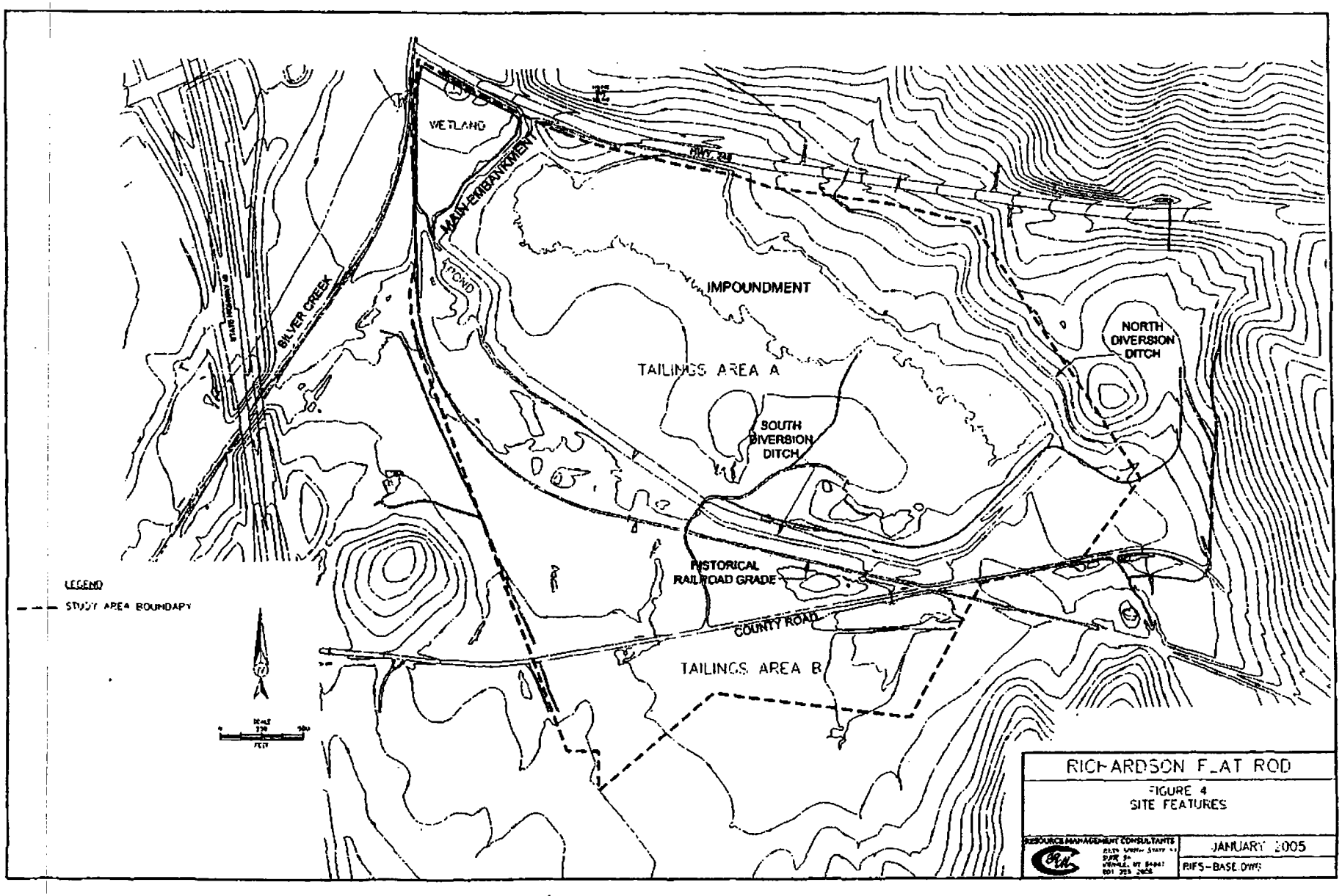
RICHARDSON FLAT RI

FIGURE 3

RESOURCE MANAGEMENT CONSULTANTS
8138 SOUTH STATE ST.
SUITE 2A
MIDVALE, UT 84047
801-255-2626

SEPTEMBER 2004

UTAH.DWG


WETLAND
MAIN EMBANKMENT
HWY 287
POND
IMPOUNDMENT
SILVER CREEK
TAILINGS AREA A
NORTH DIVERSION DITCH
SOUTH DIVERSION DITCH
HISTORICAL RAILROAD GRADE
COUNTY ROAD
TAILINGS AREA B
LEGEND
STUDY AREA BOUNDARY
RICHARDSON FLAT ROD
FIGURE 4
SITE FEATURES
JANUARY 2005
RIFS-BASE.DWG

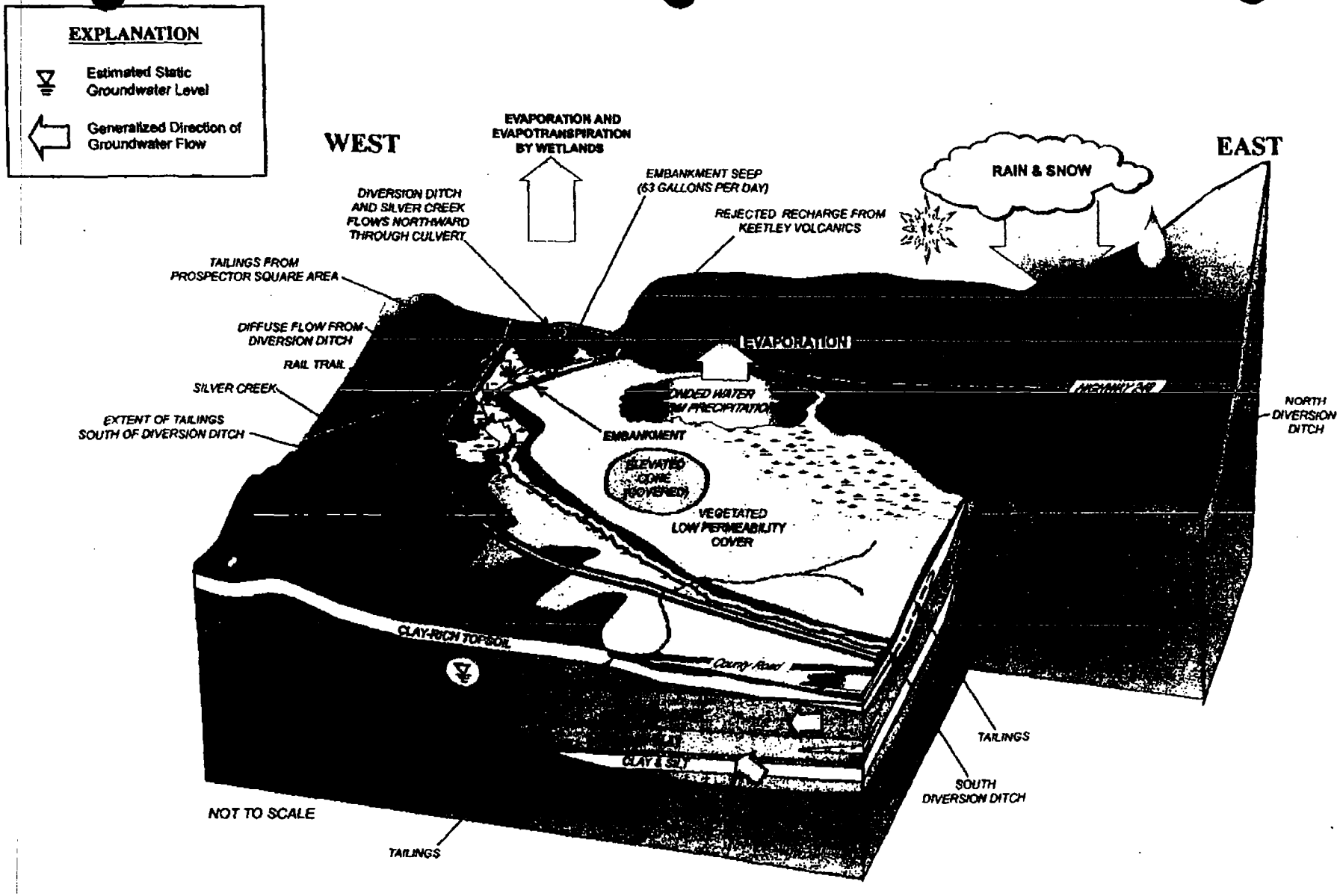


FIGURE 5

UNITED PARK CITY MINES COMPANY
CONCEPTUAL SITE MODEL
RICHARDSON FLAT

Figure 6: Conceptual Site Model for Recreational Exposure to COPCs

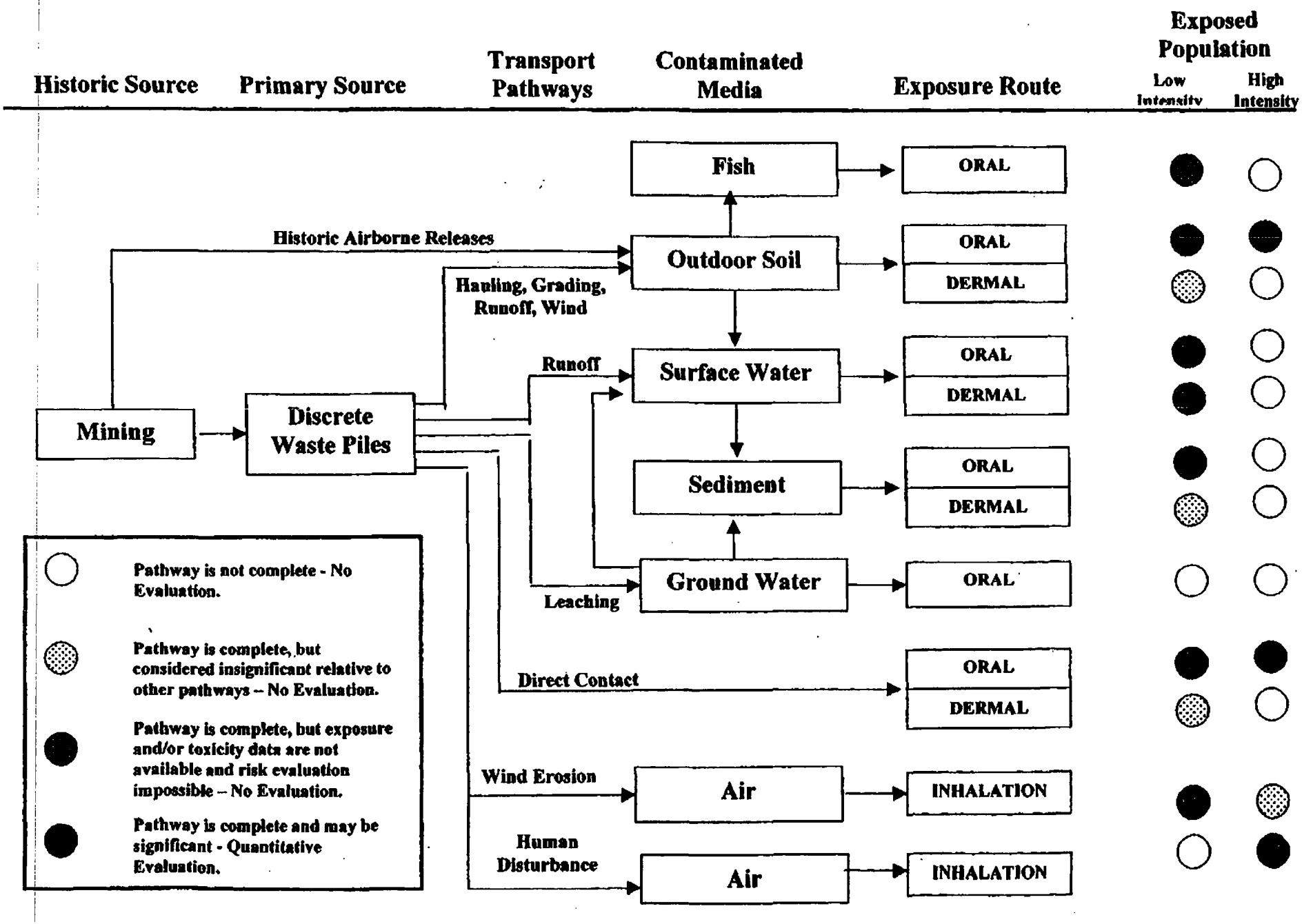
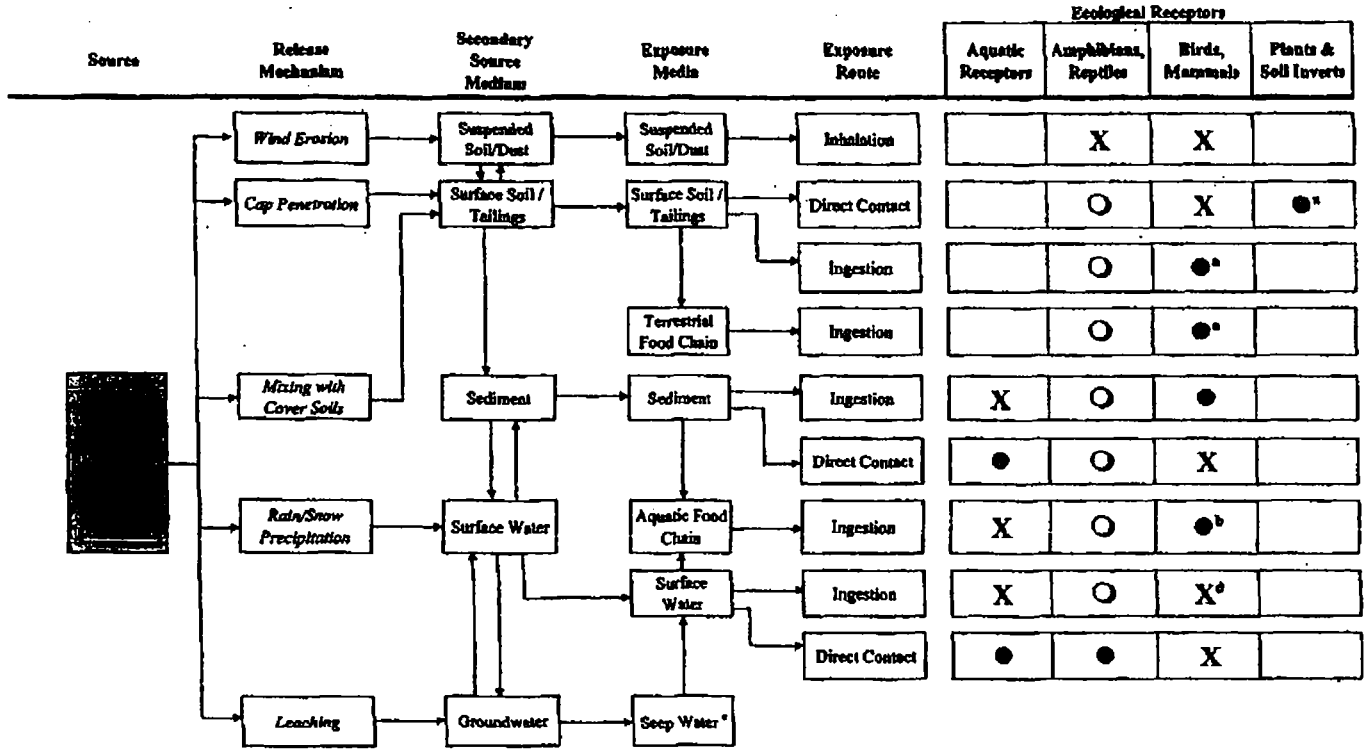


Figure 7
Richardson Flat Ecological Site Conceptual Model



LEGEND:

	Pathway not complete - no evaluation
X	Pathway complete, but considered insignificant relative to other pathways of concern
O	Pathway complete, but exposure/toxicity data are not available and quantitative risk characterization is not possible
●	Pathway complete and exposure/toxicity data are adequate for quantitative risk characterization

Footnotes:

a Terrestrial exposures for plants & soil invertebrates and wildlife will not be evaluated further in the Baseline ERA based on the expectation that additional remedial activities will address potential exposure pathways.

b Measured aquatic food item concentrations (fish, benthic invertebrates/snails, aquatic plants) are available.

c Water seeping from the toe of the main embankment may influence the wetlands area.
Measured surface water and sediment data from the wetlands area will be used to assess potential impacts from seep water in the wetlands.

d Risks to wildlife from ingestion of surface water are expected to be minor based on results provided in the SLERA.
However, because new surface water data are available, this pathway will be included in the quantitative risk characterization.

APPENDIX B

TABLES FOR THE RECORD OF DECISION

Table 7-1
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Sediment: Ingestion	Arsenic	101	310	mg/kg	12/12	200	mg/kg	95% UCL
	Lead	1,880	6,520	mg/kg	12/12	3,500	mg/kg	AM

Key:

mg/kg: milligrams per kilogram
95% UCL: 95% Upper Confidence Limit of Arithmetic Mean
MAX: Maximum Concentration
AM: Arithmetic Mean

Table 7-2
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Time frame: Current
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Surface Water - Ingestion/ dermal exposure	Arsenic	0.025	0.75	mg/L	99/291	0.012	mg/L	95% UCL
	Lead	260	0.0015	mg/L	211/425	0.13	mg/L	AM

Key

mg/L: milligrams per liter
95% UCL: 95% Upper Confidence Limit
MAX: Maximum Concentration

Table 7-3
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Scenario Time frame: Current
Medium: Soil & Tailings
Exposure Medium: *Soil & Tailings*

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Soil& Tailings: Ingestion	Arsenic	2.5	2400	mg/kg	59/64	55	mg/kg	95% UCL
	Lead	14	5900	mg/kg	62/62	660	mg/kg	AM

Key

mg/kg: milligrams per kilogram
95% UCL: 95% Upper Confidence Limit
AM: Arithmetic Mean

Table 7-4
Cancer Toxicity Data Summary

Pathway: Ingestion

Chemical of Concern	Oral Cancer *Slope* Factor	Slope Factor *Units*	Weight of Evidence/Cancer *Guideline Description*	Source	Date
Arsenic	1.5	(mg/kg)/day	A	Region 3 RBC Table	8/28/2001
Lead	NA	NA	NA	NA	NA

KEY

EPA Group:
A- Human carcinogen
B1 -Probable human carcinogen - Indicates that limited human data are available
B2 -Probable human carcinogen - Indicates sufficient evidence in animals and inadequate or no evidence in humans
C -Possible human carcinogen
D -Not classifiable as a human carcinogen
E -Evidence of noncarcinogenicity

RBC- *Risk Based Concentration*
NA: Not Applicable

Table 7-5
Non-Cancer Toxicity Data Summary

Pathway: Ingestion

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ
Arsenic	Chronic	3.0E-04	mg/kg-day	—	skin	—	Region 3 RBC Table	8/28/01
Lead[a]	—	—	—	—	—	—	—	—

Key

(1) The dermal RfD was assumed to equal the oral RfD. No adjustment factor was applied

(2) Toxicity values were pulled from the EPA Region 3 RBC Table

a There are no established criteria for lead; evaluation is made using blood lead levels

Table 7-6
Risk Characterization Summary – Carcinogens

Scenario Timeframe: Future
Receptor Population: Low Intensity Recreational User
Receptor Age: Child-Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil/Tailings	Soil/Tailings	Ingestion	Arsenic	2E-05	---	NE	2E-05
	Dust	Inhalation	Arsenic	---	3.5E-10	NE	3.5E-10
						Soil risk total =	**2E-05**
Sediment	Sediment	Ingestion	Arsenic	3E-06	---	NE	3E-06
						Sediment Risk Total=	**3E-06**
Surface Water	Surface Water	Ingestion	Arsenic	1.8E-07	NA	---	2.0E-07
		Surface Water Direct Contact	Arsenic	---	NA	3E-08	3.0E-08
						Surface Water Risk Total	**4E-07**
						Total Risk =	**2E-05**

Key
NA: Route of exposure is not applicable to this medium.
NE: Not evaluated

Table 7-7

Risk Characterization Summary – Carcinogens

Scenario Timeframe: Future
Receptor Population: High Intensity Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil/Tailings	Soil/Tailings	Soil On-site-Direct Contact	Arsenic	1.1E-05	--	NE	1.1E-05
	Dust	Soil on-site inhalation of soil as dust	Arsenic	--	6.1E-07	NE	6.1E-07
						Total Risk =	**1.1E-05**

Key
NE: Not Evaluated

Table 7-8

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Low Intensity Recreational User
Receptor Age: Child-Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil/ Tailings	Soil/ tailings	Ingestion	Arsenic	Liver	8.0E-02	N/A	---	8.0E-02
	Dust	Inhalation	Arsenic	Liver	---	1.0E-07	---	1.0E-07
							Soil/tailings Hazard Index Total =	**8.0E-02**
Sediment	Sediment	Ingestion	Arsenic	Liver	—	—	—	1.0E-02
							Sediment Hazard Index Total	**1.0E-02**
Surface Water	Surface Water	Ingestion	Arsenic	Liver	9.0E-04	N/A	---	9.0E-04
		Dermal contact	Arsenic	Liver	----	N/A	2.0E-04	2.0E-04
							Surface Water Hazard Index Total =	**1.1E-03**
							Total Risk=	**9.0E-02**

Key

— : Toxicity criteria are not available to quantitatively address this route of exposure.
N/A: Route of exposure is not applicable to this medium.

Table 7-9
Risk Characterization Summary –Non-carcinogens

Scenario Timeframe: Future
Receptor Population: High Intensity Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil/Tailings	Soil/Tailings	Ingestion	Arsenic	6.0E-02	--	NE	6.0E-02
	Dust	Inhalation	Arsenic	--	3.0E-04	NE	3.0E-04
						Total Risk =	6.0E-02

Key
N/A: Route of exposure is not applicable to this medium.

Table 7-10
Occurrence, Distribution, and Selection of Chemicals of Concern (COC)

Exposure Medium: Surface Water, Dissolved (Aquatic Receptors)

Chemical of Potential Concern	Min Conc.[1] (ug/L)	Max Conc.[1] (ug/L)	Mean Conc. (ug/L)	95 % UCL of the Mean [2] (ug/L)	Bkg Conc. (ug/L)	Screening Toxicity Value (ug/L)	Screening Toxicity Value Source [3]	HQ Value [4]	COC Flag (Y/N)
Cadmium	1.0	46.3	4.3	5.2	N/A	0.22 [5]	NAWQC Chronic	210	Y
Zinc	10	83,000	1,143	1,749	N/A	103 [5]	NAWQC Chronic	806	Y

Key
Conc. = Concentration
N/A = Not Applicable

Notes
[1] Minimum/ maximum detected concentration above the sample quantitation limit (SQL).
[2] The 95% Upper Confidence Limit (UCL) represents the RME concentration.
[3] NAWQC Chronic = USEPA National Ambient Water Quality Criteria for chronic exposures.
[4] Hazard Quotient (HQ) is defined as Maximum Concentration/ Screening Toxicity Value.
[5] Chronic NAWQC value is hardness-dependent; calculated based on the lowest measured hardness in site surface water samples (85 mg/L).

Table 7-11
Occurrence, Distribution, and Selection of Chemicals of Concern (COC)

Exposure Medium: Bulk Sediment (Benthic Invertebrates)

Chemical of Potential Concern	Min Conc.[1] (mg/kg)	Max Conc.[1] (mg/kg)	Mean Conc. (mg/kg)	95 % UCL of the Mean (mg/kg)	Bkg Conc. (mg/kg)	Screening Toxicity Value (mg/kg)	Screening Toxicity Value Source [3]	HQ Value [4]	COC Flag (Y/N)
Cadmium	0.78	179	47.2	96.7	N/A	0.99	TEC	181	Y
Copper	20	2,559	440	681	N/A	32	TEC	80	Y
Mercury	0.05	6.2	1.5	2.9	N/A	0.18	TEC	34	Y
Nickel	9.0	97	25	29	N/A	23	TEC	4.2	N
Zinc	118	44,560	9,538	19,302	N/A	121	TEC	368	Y

Key
Conc. = Concentration
N/A = Not Applicable

Notes
[1] Minimum/ maximum detected concentration above the sample quantitation limit (SQL).
[2] The 95% Upper Confidence Limit (UCL) represents the RME concentration.
[3] TEC = Consensus-based Threshold Effect Concentration (MacDonald et al., 2000)
[4] Hazard Quotient (HQ) is defined as Maximum Concentration/ Screening Toxicity Value.

Table 7-12
Occurrence, Distribution, and Selection of Chemicals of Concern (COC)

Exposure Medium: Sediment Porewater, Dissolved (Benthic organisms)

Chemical of Potential Concern	Min Conc.[1] (ug/L)	Max Conc.[1] (ug/L)	Mean Conc. (ug/L)	95 % UCL of the Mean [2] (ug/L)	Bkg Conc. (ug/L)	Screening Toxicity Value (ug/L)	Screening Toxicity Value Source [3]	HQ Value [4]	COC Flag (Y/N)
Arsenic	11	720	254	720 [5]	N/A	150	NAWQC Chronic	4.8	Y
Zinc	230	2,700	1,310	2,700 [5]	N/A	342	NAWQC Chronic	7.9	Y

Key
Conc. = Concentration
N/A = Not Applicable

Notes
[1] Minimum/ maximum detected concentration above the sample quantitation limit (SQL).
[2] The 95% Upper Confidence Limit (UCL) represents the RME concentration.
[3] NAWQC Chronic = USEPA National Ambient Water Quality Criteria for chronic exposures.
[4] Hazard Quotient (HQ) is defined as Maximum Concentration/ Screening Toxicity Value.
[5] 95UCL on the mean is greater than the maximum, maximum value is shown.
[6] Chronic NAWQC value is hardness-dependent; calculated based on the lowest measured hardness in site sediment porewater samples (351 mg/L).

Table 7-13
Occurrence, Distribution, and Selection of Chemicals of Concern (COC)

Exposure Medium: Sediment (Waterfowl)

Chemical of Potential Concern	Min Conc.[1] (ppm)	Max Conc.[1] (ppm)	Mean Conc. (ppm)	95 % UCL of the Mean [2] (ppm)	Bkg Conc. (ppm)	Screening Toxicity Value (mg/kg/d)	Screening Toxicity Value Source [3]	HQ Value [4]	COC Flag (Y/N)
Lead	641	42,990	6,407	9,641	N/A	1.63	EcoSSL Avian TRV	93 [5]	Y

Key
Conc. = Concentration
N/A = Not Applicable

Notes
[1] Minimum/ maximum detected concentration above the sample quantitation limit (SQL).
[2] The 95% Upper Confidence Limit (UCL) represents the RME concentration.
[3] Selected Ecological Soil Screening Level (EcoSSL) Toxicity Reference Value (TRV) for birds.
[4] Hazard Quotient (HQ) is defined as Maximum Concentration/ Screening Toxicity Value.
[5] Ingested Dose from sediment (mg/kg/d) calculated from maximum sediment concentration using exposure factors for the mallard duck.

Table 7-14
Occurrence, Distribution, and Selection of Chemicals of Concern (COC)

Exposure Medium: Soil/Tailings (Plants, Soil Invertebrates)

Chemical of Potential Concern	Min Conc.[1] (ppm)	Max Conc.[1] (ppm)	Mean Conc. (ppm)	95 % UCL of the Mean [2] (ppm)	Mean Bkg Conc. (ppm)	Screening Toxicity Value (ppm)	Screening Toxicity Value Source [3]	HQ Value [4]	COC Flag (Y/N)
Aluminum	813	32,700	10,662	18,066	N/A	50	Plant SSL	654	Y
Lead	13	31,600	1,666	3,206	42	50	Plant SSL	632	Y
Mercury	0.11	85	5	7.3	0.08	0.1	Invert. SSL	850	Y
Zinc	47	33,800	4,085	15,255	104	50	Plant SSL	676	Y

Key
Conc. = Concentration
N/A = Not Applicable

Notes
[1] Minimum/ maximum detected concentration above the sample quantitation limit (SQL).
[2] The 95% Upper Confidence Limit (UCL) represents the RME concentration.
[3] Soil Screening Level (SSL), lowest of plant SSL or soil invertebrate SSL.
[4] Hazard Quotient (HQ) is defined as Maximum Concentration/ Screening Toxicity Value.

Table 7-15
Ecological Exposure Pathways of Concern

Exposure Medium	Sensitive Environment Flag (Y or N)	Receptor	Endangered/ Threatened Species Flag (Y or N)	Exposure Routes	Assessment Endpoints	Measurement Endpoints
Sediment/Sediment porewater	N	Benthic organisms	N	Ingestion and direct contact with chemicals in sediment	Protection of aquatic invertebrates and fish from adverse effects related to exposure to chemicals in surface water and sediment	· Comparison of sampling location-specific chemical concentrations in sediment to benthic macroinvertebrate toxicity benchmarks. · Comparison of sampling location-specific chemical concentrations in sediment porewater to benthic macroinvertebrate toxicity benchmarks. · Evaluate the toxicity of site sediment to *Hyalella azteca* (growth and survival) through laboratory testing.
Surface Water	N	Fish	N	Ingestion and direct contact with chemicals in surface water		· Comparison of sampling location specific chemical concentrations in surface water to National Ambient Water Quality Criteria.
Soil/Tailings	N	soil invertebrates	N	Ingestion and direct contact with chemicals in wetland soils	Survival of terrestrial invertebrate community	· Comparison of sampling location specific chemical concentrations in soil to terrestrial toxicity benchmarks
		Terrestrial plants	N	Uptake of chemicals via root systems	Maintenance/enhancement of native site vegetation	
Dietary Intake	N	Wildlife (birds and mammals)	N	ingestion of food chain items	Protection of wildlife from adverse effects to growth, reproduction, or survival related to exposure to chemicals in surface water, sediment, and aquatic food items.	· Comparison of reach-specific chemical doses estimated from exposure point concentrations (EPCs) in surface water, sediment, and aquatic food items to toxicity reference values (TRVs) for wildlife.

Table 7-16
Summary of Uncertainties

Assessment Component	Description	Likely Direction of Error	Likely Magnitude of Error
Nature and Extent of Contamination	Samples collected may not be fully representative of variability in space or time, especially if the number of samples is small.	Unknown	Probably small
	Analytical results may be imprecise.	Unknown	Probably small
Exposure Assessment	Some exposure pathways were not evaluated.	Underestimate of risk	Probably small
	Some chemicals were not evaluated because chemical was never detected, but detection limit was too high to detect the chemical if it were present at a level of concern.	Underestimate of risk	Usually small
	Exposure parameters for wildlife receptors are based on studies at other sites.	Unknown	Probably small
	Exposure point concentrations for wildlife receptors are based on a conservative estimate of the mean concentration in the exposure area.	Overestimate of risks	Possibly significant
	Absorption from site media is assumed to be the same as in laboratory studies.	Overestimate of risks	Possibly significant
Toxicity Assessment	Many chemicals lack reliable toxicity benchmarks for some receptors for some media; these chemicals are not evaluated.	Underestimation of risk	Probably small in most cases
	Available toxicity benchmarks are often based on limited data, and values must be extrapolated across species.	Unknown	Unknown, could be significant
	Wildlife receptors selected as representative species may not capture the full range of sensitivities in site receptors.	Unknown	Probably small
	Aquatic toxicity benchmarks are based on a wide range of species, some of which do not occur at this site.	Likely to overestimate risk	Probably small
Risk Characterization	Interactions between chemicals are difficult to account for; effects of one chemical may increase, decrease, or have no effect on other chemicals.	Unknown	Unknown, but probably small
	Estimation of population-level effects from HQ calculations is difficult and subject to professional judgement.	Unknown	Unknown, probably small in most cases

Table 10-1
Summary and Comparative Analysis of Final Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Soil Cover/Institutional Controls and Wedge Barriers	Alternative 3 Soil Cover/Source Removal and Wedge Barriers	Alternative 4 Excavation, treatment and Offsite Disposal	Alternative 5 Excavation, Treatment and Onsite Disposal
OVERALL PROTECTIVENESS					
Human Health- Direct contact and inhalation.	Based on results of BHHRA human health exposures at the Site are within acceptable limits.	The cover reduces direct contact, inhalation and ingestion of contaminated soil and meets human health requirements.	The cover reduces direct contact, inhalation and ingestion of contaminated soil and meets human health requirements. Potential for contact reduced by a reduction in extent of tailings. Some protection to wetland environment by partial source removal.	Removal, treatment and offsite disposal of contaminated material reduces and eliminates the risk of direct contact, inhalation and ingestion of contaminated soil and meets human health requirements	Removal, treatment and onsite disposal of contaminated material reduces and potentially eliminates the risk of direct contact, inhalation and ingestion of contaminated soil and meets human health requirements
Environmental Protection	Site exposures remain. There is likely to be some attenuation over time in water.	The soil cover reduces some ecological risk and will help to reduce surface water infiltration into the contaminated materials and hence will improve groundwater quality. The source material stays in place	The soil cover reduces some ecological risk and will help to reduce surface water infiltration into the contaminant material. Most material will be located in the geometrically confined impoundment. Removal of groundwater and surface water contamination source areas will improve water quality.	Site contamination is removed and the environmental quality of Site is improved.	Site contamination is treated and the environmental quality of Site is improved.
COMPLIANCE WITH ARARS					
Chemical-specific ARAR	Not satisfied	Environmental protection is met, however all contamination remains onsite.	Air quality protection is met, however all contamination remains onsite but is located in a confined location in a closed impoundment. Surface water and groundwater quality is improved.	Air quality protection is met and all contamination is removed from the Site. Surface water and groundwater standards are met.	Air quality protection is met and contamination is treated onsite. Surface water and groundwater standards are met.
Location-specific ARAR	Not satisfied	Location-specific ARARs are met	Location-specific ARARs are met	Location-specific ARARs are met	Location-specific ARARs are met
Action-specific ARAR	Not applicable	Federal and State regulations will be met during remedial activities	Federal and State regulations will be met during remedial activities	Federal and State regulations will be met during remedial activities	Federal and State regulations will be met during remedial activities
Other criteria/guidance	Would allow contact, however human health risks are within acceptable limit.	protects against inhalation/direct contact.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.
LONG-TERM EFFECTIVENESS AND PERMANENCE					
Magnitude of residual risk	Source not removed. Existing risk will remain.	Source not removed. Existing risk will be reduced by the soil cover.	Source is partially removed. Existing risk will remain but will be reduced as most materials will be placed in controlled location in a confined impoundment and covered. Surface water and groundwater quality is improved.	Contaminated materials are removed from the Site. No residual risk.	Contaminated materials are treated and left onsite. Magnitude of residual risk is significantly reduced. No residual risk
Adequacy and reliability of controls	No controls over remaining contamination. No reliability.	Soil cover integrity will be maintained by institutional controls and monitoring. Reliability will be maximized through cover design and enforcement of institutional controls.	Soil cover integrity will be maximized by institutional controls and monitoring. Reliability will be maximized through design and enforcement of institutional controls as well as placement of tailings in geometrically confined impoundment.	None required, contaminated material will be removed from Site.	Site and treated materials will be monitored to insure that Site is not affecting human health and the environment.
REDUCTION OF TOXICITY, MOBILITY OR VOLUME					
Treatment process used	None used	None used	None used	Stabilization/fixation	Stabilization/fixation
Amount destroyed or treated	None	None	None	2,847,087 cubic yards	2,847,087 cubic yards
Reduction of toxicity, mobility or volume treatment	None	Mobility is reduced by soil cover.	Mobility is reduced by moving most contaminated materials into the geometrically confined impoundment with a soil cover. Remaining materials will be covered.	Mobility is reduced by treatment and disposal in a regulated facility. Increase in volume with a decrease in toxicity.	Mobility is reduced by treatment. Increase in volume with a decrease in toxicity.
Statutory preference for treatment	Does not satisfy	Does not satisfy	Does not satisfy	Satisfied	Satisfied
SHORT TERM EFFECTIVENESS					
Community protection	Risk not increased by remedy implementation.	Risk not increased by remedy implementation	Risk not increased if action specific ARARs are met during remediation.	Risk not increased if action specific ARARs are met during remediation. Transportation may increase community risks due to increase in truck traffic.	Risk not increased if action specific ARARs are met during remediation.
Worker protection	No risk to workers	Risk is minimal since contaminated material is not being handled.	Workers will be handling contaminated material during onsite transport, contact with contaminated fugitive dust is possible during excavation and disposal	Workers will be handling contaminated material during onsite transport and treatment, contact with contaminated fugitive dust is possible during excavation and disposal	Workers will be handling contaminated material during onsite transport and treatment, contact with contaminated fugitive dust is possible during excavation and disposal
Environmental impacts	Continued impact from existing conditions	Dust generated during remedial activities.	Dust generated during remedial activities.	Dust generated during remedial activities. Potential effects from ditch excavation.	Dust generated during remedial activities. Potential effects from ditch excavation.
Time until action is complete	N/A	One to two construction seasons.	One to two construction seasons.	One to two construction seasons.	One to two construction seasons.
IMPLEMENTABILITY					
Ability to construct and operate	No construction or operation required.	Standard excavation and transportation technologies are easily implemented. Standard institutional controls easily implemented. Cover soil is stockpiled onsite and available locally.	Standard excavation and transportation technologies are easily implemented. Remedial contractors are locally available. Cover soil is stockpiled onsite and available locally.	Standard excavation and transportation technologies are easily implemented. Remedial contractors are locally available. Cover soil is stockpiled onsite and available locally. Bench-scale testing will need be conducted. Treatment contractors and disposal facilities are available.	Standard excavation and transportation technologies are easily implemented. Remedial contractors are locally available. Cover soil is stockpiled onsite and available locally. Bench-scale testing will need be conducted. Treatment contractors and disposal facilities are available.
Ease of additional remediation, if needed	Easy, as no remediation has been done in this alternative.	Would impact original remedy.	Would impact original remedy.	Would impact original remedy.	Would impact original remedy.
Ability to monitor effectiveness	No monitoring required.	Periodic monitoring required.	Periodic monitoring required.	Periodic monitoring required until verification that site is not affecting human or environmental health.	Periodic monitoring required until verification that site is not affecting human or environmental health.
Ability to obtain approval from other agencies	Very difficult to obtain "no action" from agencies.	Difficult to obtain approval since ground water source contamination is left in place. High level of coordination with state and federal agencies will be required for long-term monitoring and compliance.	Less difficult than Alternative 2 since ground water source contamination is removed. Moderate level of coordination with state and federal agencies will be required for long-term monitoring and compliance.	Less difficult than Alternatives 2 and 3 since contamination is removed. Moderate level of coordination with state and federal agencies will be required for short-term monitoring and compliance. Agency coordination will be required for disposal.	More difficult than Alternatives 3 and 4 since contamination remains onsite. Moderate level of coordination with state and federal agencies will be required for short-term monitoring and compliance. Agency coordination will be required for disposal and site closure.
Availability of services and capacities	No services or capacities required.	No disposal required. All services available.	No disposal required. All services available.	Disposal types and capacities need to be determined, but should be available. Large scale transportation logistics will be required.	Final volumes need to be determined, but buildup of impoundment height should provide sufficient volume capacity.
Availability of technology	None required	Required technology available.	Required technology available.	Specialized treatment technology is required but available.	Specialized treatment technology is required but available.
COST					
Direct Capital Cost	$0	$1,849,281.09	$2,309,476.50	$189,541,230	$121,892,700.25
Indirect Costs (includes O&M)	$0	$446,114.99	$743,523	$73,671,558	$23,806,000
Total Cost	$0	$2,295,397.99	$4,363,739.63	$263,234,037.85	$144,788,785.92

Notes
A - Will be evaluated during the CERCLA Arrangement Public Comment period
ARAR - Applicable or Relevant and Appropriate Requirement
O&M - Operations, maintenance, and monitoring

Table 10-2

Ranking of Final Alternatives

Criteria	Ranking Weight (1)	Alternative 1 No Action		Alternative 2 Soil Cover/ Institutional Controls		Alternative 3 Source Removal, Soil Cover and Wedge Buttress		Alternative 4 Excavation, Treatment and Offsite Disposal		Alternative 5 Excavation, Treatment and Onsite Disposal	
		Rank (2)	Weight Factored Rank (3)	Rank (2)	Weight Factored Rank (3)	Rank (2)	Weight Factored Rank (3)	Rank (2)	Weight Factored Rank (3)	Rank (2)	Weight Factored Rank (3)
OVERALL PROTECTIVENESS											
Human Health	10	1	10	4	40	4	40	5	50	5	50
Environmental protection	10	1	10	2	20	4	40	5	50	5	50
COMPLIANCE WITH ARARS											
Chemical-specific ARAR	8	1	8	2	16	3	24	5	40	5	40
Location-specific ARAR	5	1	5	2	10	4	20	5	25	4	20
Action-specific ARAR	5	1	5	3	15	4	20	5	25	4	20
Other criteria/guidance	5	1	5	2	10	2	10	5	25	4	20
LONG-TERM EFFECTIVENESS AND PERMANENCE											
Magnitude of residual risk	9	1	9	3	27	4	36	5	45	5	45
Adequacy and reliability of controls	8	1	8	3	24	4	32	5	40	5	40
REDUCTION OF TOXICITY, MOBILITY OR VOLUME											
Treatment process used	5	1	5	1	5	1	5	5	25	5	25
Amount destroyed or treated	5	1	5	1	5	1	5	4	20	4	20
Reduction of toxicity, mobility or volume treatment	7	1	7	2	14	3	21	5	35	4	28
Statutory preference for treatment	10	1	10	1	10	1	10	5	50	5	50
SHORT TERM EFFECTIVENESS											
Community protection	5	1	5	4	20	4	20	1	5	2	10
Worker protection	4	1	4	4	16	4	16	1	4	2	8
Environmental impacts	5	1	5	2	10	4	20	1	5	2	10
Time until action is complete	2	1	2	4	8	3	6	1	2	2	4
IMPLEMENTABILITY											
Ability to construct and operate	9	5	45	4	36	4	36	1	9	2	18
Ease of additional remediation, if needed	5	4	20	3	15	4	20	5	25	1	5
Ability to monitor effectiveness	6	5	30	3	18	5	30	5	30	4	24
Ability to obtain approval from other agencies	5	1	5	2	10	4	20	5	25	4	20
Availability of services and capacities	3	4	12	3	9	4	12	5	15	2	6
Availability of equipment, specialists and materials	3	4	12	5	15	4	12	5	15	2	6
Availability of technology	3	4	12	5	15	4	12	5	15	2	6
RANKING TOTALS		43	239	65	368	79	467	94	580	80	525
COST											
Present worth cost		$0.00		$2,295,397.99		$4,262,729.65		$343,234,057.85		$144,708,705.72	

(1) - Each criteria has been ranked on an overall project importance weight of 1-10 with 1 signifying the least importance and 10 signifying the greatest importance.

(2) - The compliance of each criteria has been ranked on an alternative by alternative basis on a scale of 1-5 with 1 signifying the least compliance and 5 signifying the greatest compliance.

(3) - Ranking weight multiplied by the compliance rank for each alternative.

Table 10-3
Chemical Specific ARARs

Requirement	Citation	Description	Determination	Comment
Definitions and General Requirements of Utah Water Quality Act	UAC R317-1	Provides definitions and general requirements for waste discharges to waters of the State of Utah	Applicable	Substantive standards are applicable to point source discharges of contaminants into Silver Creek (if any), but permitting requirements would be preempted by operation of 42 USC 9621(e)(1).
Utah Surface Water Quality Standards	UAC R317-2-6 UAC R317-2-13 UAC R317-2-14	Establishes use designations for Silver Creek (as tributary to the Weber River): Class 1C - Protected for domestic purposes with prior treatment processes as required by Utah Div. of Drinking Water. Class 2B - Protected for secondary contact recreation such as boating, wading. Class 3A - Protected for cold water species of game fish and aquatic life. Class 4 - Protected for agricultural uses and stock watering	Applicable	Substantive standards are applicable to point source discharges of contaminants into Silver Creek (if any), but permitting requirements would be preempted by operation of 42 USC 9621(e)(1).
Groundwater Quality	UAC R317-6	Establishes state groundwater quality standards	Applicable	Substantive standards are applicable to discharges of contaminants to ground water discharges (if any), but permitting requirements would be preempted by 42 USC 9621(e)(1).
Solid and Hazardous Waste	UAC R315-2-4(b)(7)	Criteria for the Identification and Listing of Hazardous Waste	Applicable	Mine tailings are not a solid waste and a hazardous waste if they do not cause a public health hazard or are otherwise determined to be a hazardous waste.
Solid and Hazardous Waste	UAC R311-211-3	Corrective Action Cleanup Standards Policy -UST and CERCLA sites	Applicable	RPM will establish appropriate cleanup standards based on the factors set forth in R311-211-3.
Utah Storm Water Rules	UAC R317-8-3.9	Establishes state storm water requirements	Applicable	Requires implementation of best management practices to address storm water management at the Site.

Table 10-3 (continued)
Location Specific ARARs

Requirement	Citation	Description	Determination	Comment
Protection of Wetlands	33 USC § 1344	Prohibits discharge of dredged or fill materials into waters of the United States.	Relevant and Appropriate	Although 404 permit is not required, the remedy should seek to avoid, restore, or mitigate impacts to jurisdictional wetlands as appropriate.
Historic Sites, Building and Antiquities Act	16 USC §§ 461-467	Requires protection of landmarks listed on National Registry	Applicable	Proposed activities will not adversely affect any listed landmark
National Historic Preservation	16 USC § 470	Requires protection of district, site, building, structure or object eligible for inclusion in national register of historic places	Applicable	Proposed activities will not adversely affect any such district, site, building, structure or object
Archeological and Historic Preservation Act	16 USC § 469	Requires preservation of significant historical and archeological data	Applicable	Proposed activities will not adversely affect archeological data or landmarks
Fish and Wildlife Coordination Act	16 USC § 662	Requires that actions taken in areas that may affect streams and rivers be undertaken in a manner that protects fish and wildlife	Applicable	USFWS has been consulted with regard to actions impacting Silver Creek
Endangered Species Act	16 USC § 1531	Requires protection of endangered and threatened species	Applicable	USFWS has been consulted with regard to protection of endangered and threatened species.
Migratory Bird Treaty Act	16 USC § 703 *et seq*	Requires protection of migratory nongame birds	Applicable	USFWS has been consulted with regard to protection of migratory nongame birds.
RCRA Subtitle D Solid Waste Requirements	UAC R315-303-3(4)	Establishes closure requirements for permitted solid waste landfills.	Relevant/Appropriate	Relevant and appropriate to onsite repository under Alternatives 3 and 5, to the extent technically practicable.
Air Quality	UAC R307-205-6	Emission Standards	Applicable	Requires management practices to limit fugitive emissions from tailings piles.

Table 10-3 (continued)
Action Specific ARARs

Requirement	Citation	Description	Determination	Comment
Abandoned wells	UAC R655-4	Standards for drilling and abandonment of wells.	Applicable	Applicable to the drilling or closing of wells that are abandoned or installed as part of the remedy.
Utah Storm Water Rules	UAC R317-8-3.9	Establishes state storm water requirements	Applicable	Requires implementation of best management practices to address storm water management at the Site.
Criteria for Classification of Solid Waste and Disposal Facilities and Practices	40 CFR Part 257.3	Establishes Criteria for use in determining which solid waste facilities and practices could adversely affect human health and the environment	Applicable	
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes Standards for Generators of Hazardous Waste	Applicable	Applicable to any waste that is not Bevill-exempt.
General Facilities Standards	UAC R315-8-2	Location Standards	Applicable	Applicable to any waste that is not Bevill-exempt.
Closure and Post Closure	UAC R315-8-6	Closure Plan/Performance Standards	Applicable	Applicable to any waste that is not Bevill-exempt.

Table 10-3 (continued)
Action Specific ARARs

Waste Piles	UAC R315-8-12	Waste piles performance standards	Applicable	Applicable to any waste that is not Bevill-exempt.
Landfills	UAC R315-8-14	Performance standards for landfills	Applicable	Applicable to any waste that is not Bevill-exempt.
Risk Based Closure Standards	UAC R315-101	Establishes risk-based closure and corrective action standards	Applicable	Applicable to any waste that is not Bevill-exempt.
Corrective Action Cleanup Standards Policy	UAC R311-211	Lists general criteria in Establishing clean up standards	Applicable	
OSHA	29 USC § 651	Regulates workers health and safety	Applicable	
Utah Ground Water Quality Protection Rules	UAC R317-6	Contaminants that remain on site must not present a leaching threat to ground water	Applicable	
Standards Applicable to Hazardous Waste Transporters	40 CFR Part 263	Regulates Transportation of Hazardous Waste	Applicable	Relevant and appropriate to any waste that is not Bevill-exempt.

Table12-1
Cost Alternative 3
Source Removal/ Soil Cover and Wedge Buttress

Direct Capital Costs	Quantity	Unit	Cost	Total Cost
Diversion Ditch				
Place 1' gravel cover	956	cyd	$12.00	$11,472.00
Signs	20	sign	$50.00	$1,000.00
		Subtotal		**$12,472.00**
Tailings South of Diversion Ditch				
Site preparation (clearing, grubbing .)	50	ac	$1,000.00	$50,000.00
Excavate and haul to impoundment (partial source removal)	178,268	cy	$5.75	$1,025,029.50
Place soil cover (bring up to 12", haul, spread, compact)	27,492	cy	$4.80	$131,961.60
Place topsoil (.5') excavated and covered areas	40,062	cy	$4.80	$192,297.60
Dust control	20	days	$735.00	$14,700.00
Reconstruct tributary channel	1,481	cy	$7.50	$11,107.50
Grading (stormwater runoff control)	24	hrs	$140.00	$3,360.00
Revegetation	50	ac	$500.00	$25,000.00
		Subtotal		**$1,453,456.20**
Wetland				
Place fill for trackhoe access	3,040	cy	$4.80	$14,592.00
Excavate and haul to impoundment	13,440	cy	$5.75	$77,280.00
Restoration	10,400	cy	$10.00	$104,000.00
Silver Creek diversion	500	cy	$7.50	$3,750.00
Revegetation	7	ac	$500.00	$3,250.00
		Subtotal		**$202,872.00**
Impoundment				
Site preparation (clearing, grubbing..)	115	ac	$1,000.00	$115,000.00
Place tailings from TSDD and Wetland (grade and compact)	191,742	cy	$1.50	$287,613.00
Place soil cover (bring up to 12", haul, spread, compact)	136,853	cy	$4.80	$656,894.40
Construct drainage channel (to SDD)	1,556	cy	$7.50	$11,670.00
Place topsoil (.5')	79,218	cy	$4.80	$380,246.40
Dust control	20	days	$735.00	$14,700.00
Grading (stormwater runoff control)	80	hrs	$140.00	$11,200.00
revegetation	115	ac	$500.00	$57,500.00
		Subtotal		**$1,534,823.80**
Embankment (wedge buttress)				
Site preparation (clearing, grubbing..)	0.75	ac	$1,000.00	$750.00
Place drain material	1,210	cy	$8.00	$9,680.00
Place buttress material (includes compaction of lifts)	7,200	cy	$6.00	$43,200.00
Dust control	6	days	$735.00	$4,410.00
Erosion protection (stormwater runoff control)	300	cy	$7.50	$2,250.00
Revegetation	0.75	ac	$750.00	$562.50
		Subtotal		**$60,852.50**
Long-Term Operation and Maintenance Costs				
O&M	15	yr	$4,000.00	$60,000.00
Annual Sampling	15	yr	$2,000.00	$30,000.00
Reporting	15	yr	$5,000.00	$75,000.00
Develop Institutional Controls	1		$5,000.00	$5,000.00
Institutional Controls Monitoring and Repair (fencing, signs)	15	yr	$5,000.00	$75,000.00
		Subtotal		**$245,000.00**
			Total Direct Costs	**$3,509,476.50**
Indirect Capital Costs				
Engineering Design and Project Administration				$50,000.00
Monitoring Plan				$4,000.00
Construction Oversight (2.5 % of Direct Capital Cost)				$87,736.91
Contingency (15 % of Direct Capital Cost)				$526,421.48
Health and Safety (1 % of Capital Costs)				$35,094.77
EPA Oversight				$50,000.00
		Subtotal		**$753,253.15**
			Total Indirect Costs	**$753,253.15**
TOTAL COSTS				**$4,262,729.65**

Table 12-2
Present Worth Cost
Alternative 3

Year	Capitol Costs	Annual O&M Costs	Periodic Costs	Total Costs	Discount Factor at 7%	Total Present Value Cost at 7%
0	803,546.00		5,000.00	808,546.00	1.00	808,546.00
1	803,546.00	16,000.00		819,546.00	0.94	766,275.51
2	803,546.00	16,000.00		819,546.00	0.87	715,463.66
3	803,546.00	16,000.00		819,546.00	0.82	668,749.54
4	803,546.00	16,000.00		819,546.00	0.76	625,313.60
5		16,000.00		16,000.00	0.71	11,408.00
6		16,000.00		16,000.00	0.67	10,656.00
7		16,000.00		16,000.00	0.62	9,968.00
8		16,000.00		16,000.00	0.58	9,312.00
9		16,000.00		16,000.00	0.54	8,704.00
10		16,000.00		16,000.00	0.51	8,128.00
11		16,000.00		16,000.00	0.48	7,600.00
12		16,000.00		16,000.00	0.44	7,104.00
13		16,000.00		16,000.00	0.42	6,640.00
14		16,000.00		16,000.00	0.39	6,208.00
15		16,000.00		16,000.00	0.36	5,792.00
Total	4,017,730.00	240,000.00	5,000.00	4,262,730.00		3,675,868.30

assumes spreading the capitol costs over 5 years
15 years of O&M

Table 13-1
Cost Alternative 2
Soil Cover/Insitutional Controls

Direct Capital Costs	Quantity	Unit	Cost	Total Cost	
Diversion Ditch					
Place 1' gravel cover	956	cyd	$12.00	$11,472.00	
Signs	20	sign	$50.00	$1,000.00	
		Subtotal		$12,472.00	
Tailings South of Diversion Ditch					
Site preparation (clearing, grubbing..)	50	ac	$1,000.00	$50,000.00	
Place soil cover (bring up to 12")	40,062	cy	$5.75	$230,356.50	
Place topsoil (.5')	40,062	cy	$4.80	$192,297.60	
Dust control	20	days	$735.00	$14,700.00	
Reconstruct tributary channel	1,481	cy	$7.50	$11,107.50	
revegetation	50	ac	$500.00	$25,000.00	
		Subtotal		$523,461.60	
Impoundment					
Site preparation (clearing, grubbing..)	115	ac	$1,000.00	$115,000.00	
Place soil cover (bring up to 12")	79,218	cy	$5.75	$455,503.50	
Place topsoil (.5')	79,218	cy	$4.80	$380,246.40	
Construct drainage channel (to SDD)	1,667	cy	$7.50	$12,502.50	
Dust control	20	days	$735.00	$14,700.00	
Grading (stormwater runoff control)	80	hrs	$140.00	$11,200.00	
revegetation	115	ac	$500.00	$57,500.00	
		Subtotal		$1,046,652.40	
Embankment (wedge buttress)					
Site preparation (clearing, grubbing..)	0.75	ac	$1,000.00	$750.00	
Place drain material	1,170	cy	$8.00	$9,360.00	
Place buttress material (includes compaction of lifts)	7,200	cy	$6.00	$43,200.00	
Dust control	6	days	$735.00	$4,410.00	
Erosion protection (stormwater runoff control)	300	cy	$12.00	$3,600.00	
Revegetation	0.75	ac	$500.00	$375.00	
		Subtotal		$61,696.00	
Long-Term Operation and Maintenance Costs					
O&M	15	yr	$4,000.00	$60,000.00	
Annual Sampling	15	yr	$2,000.00	$30,000.00	
Reporting	15	yr	$5,000.00	$75,000.00	
Develop Institutional Controls	1		$10,000.00	$10,000.00	
Institutional Controls Monitoring and Repair (fencing, signs)	15	yr	$2,000.00	$30,000.00	
		Subtotal		$205,000.00	
			Total Direct Costs		$1,849,281.00
Indirect Capital Costs					
Engineering Design and Project Administration				$50,000.00	
Monitoring Plan				$4,000.00	
Construction Oversight (2.5 % of Direct Capital Cost)				$46,232.03	
Contingency (15 % of Direct Capital Cost)				$277,392.15	
Health and Safety (1 % of Capital Costs)				$18,492.81	
EPA Oversight				$50,000.00	
		Subtotal		$446,116.99	
			Total Indirect Costs		$446,116.99
TOTAL COSTS					$2,295,397.99

Table 13-2
Cost Alternative 4
Excavation, Treatment and Offsite Disposal

Direct Capital Costs	Quantity	Unit	Cost	Total Cost
Diversion Ditch (removal)				
Remove sediments and tailings haul to treatment	232,636	cy	$6.00	$1,395,816.00
revegetation	2	ac	$500.00	$1,000.00
		Subtotal		$1,396,816.00
Tailings South of Diversion Ditch				
Site preparation (clearing, grubbing..)	50	ac	$1,000.00	$50,000.00
Excavate and haul to treatment/loadout (tails, base and exs. cover)	394,744	cy	$5.75	$2,269,778.00
Place topsoil	40,062	cy	$4.80	$192,297.60
Dust control	20	days	$735.00	$14,700.00
Reconstruct tributary channel	1,481	cy	$7.50	$11,107.50
Grading (reclamation and stormwater runoff control)	40	hrs	$140.00	$5,600.00
revegetation	50	ac	$500.00	$25,000.00
		Subtotal		$2,568,483.10
Impoundment				
Site preparation (clearing, grubbing..)	115	ac	$1,000.00	$115,000.00
Excavate tailings, base and existing cover, haul to loadout	2,353,609	cy	$5.75	$13,533,251.75
Place topsoil	93,993	cy	$4.80	$451,166.40
Reconstruct original channel	3,911	cy	$7.50	$29,332.50
Dust control	30	days	$735.00	$22,050.00
Grading (stormwater runoff control)	40	hrs	$140.00	$5,600.00
revegetation	115	ac	$500.00	$57,500.00
		Subtotal		$14,213,900.65
Embankment				
excavate and haul	65,290	cy	$5.75	$375,417.50
Dust control	8	days	$735.00	$5,880.00
Erosion protection (stormwater runoff control)	500	cy	$7.50	$3,750.00
Revegetation	2	ac	$500.00	$1,000.00
		Subtotal		$386,047.50
Wetland				
Place fill for trackhoe access	3,040	cy	$4.80	$14,592.00
Excavate and haul to treatment/loadout	13,440	cy	$5.75	$77,280.00
Wetland restoration	10,365	cy	$10.00	$103,650.00
Silver Creek diversion	500	cy	$7.50	$3,750.00
		Subtotal		$199,272.90
Stabilization and disposal - ECDC				
Dust control	30	days	$735.00	$22,050.00
Erosion protection (stormwater runoff control)	1,000	cy	$7.50	$7,500.00
Stabilization	2,980,988	cy	$30.00	$89,429,640.00
Load to trucks	4,471,482	cy	$1.50	$6,707,223.00
Haul to landfill (43 ton belly dump trucks)	4,471,482	cy	$9.00	$40,243,338.00
disposal fees	4,471,482	cy	$30.00	$134,144,460.00
Sample analysis	250	sample	$150.00	$37,500.00
		Subtotal		$270,591,711.00
Long-Term Operation and Maintenance Costs				
O&M	15	yr	$4,000.00	$60,000.00
Annual Sampling	15	yr	$2,000.00	$30,000.00
Reporting	15	yr	$5,000.00	$75,000.00
Develop Institutional Controls	1		$10,000.00	$10,000.00
Institutional Controls Monitoring and Repair	15	yr	$2,000.00	$30,000.00
		Subtotal		$205,000.00
			Total Direct Costs	$289,561,230.25
Indirect Capital Costs				
Engineering Design and Project Administration				$50,000.00
Monitoring Plan				$4,000.00
Construction Oversight (2.5 % of Direct Capital Cost)				$7,239,030.76
Contingency (15 % of Direct Capital Cost)				$43,434,184.54
Health and Safety (1 % of Capital Costs)				$2,895,612.30
EPA Oversight				$50,000.00
		Subtotal		$53,672,827.60
			Total Indirect Costs	$53,672,827.60
TOTAL COSTS				$343,234,057.85

Table 13-3
Cost Alternative 5
Onsite Treatment and Disposal

Direct Capital Costs	Quantity	Unit	Cost	Total Cost
Diversion Ditch				
Remove sediments and tailings haul to treatment	232,636	cy	$6.00	$1,395,816.00
revegetation	2	ac	$500.00	$1,000.00
		Subtotal		**$1,396,816.00**
Tailings South of Diversion Ditch				
Site preparation (clearing, grubbing..)	50	ac	$1,000.00	$50,000.00
Excavate and haul to treatment (tails and exs. cover)	394,744	cy	$5.75	$2,269,778.00
Place topsoil	40,062	cy	$4.80	$192,297.60
Dust control	20	days	$735.00	$14,700.00
Reconstruct tributary channel	1,481	lf	$7.50	$11,107.50
Grading (reclamation and stormwater runoff control)	40	hrs	$140.00	$5,600.00
revegetation	50	ac	$500.00	$25,000.00
		Subtotal		**$2,568,483.10**
Impoundment				
Site preparation (clearing, grubbing..)	115	ac	$1,000.00	$115,000.00
Excavate tailings and existing cover, haul to loadout	2,353,609	cy	$5.75	$13,533,251.75
Place topsoil	93,993	cy	$4.80	$451,166.40
replace treated materials	4,471,482	cy	$1.50	$6,707,223.00
construct drainage channel (center to SDD)	3,911	cy	$7.50	$29,332.50
Dust control	30	days	$735.00	$22,050.00
Grading (stormwater runoff control)	40	hrs	$140.00	$5,600.00
revegetation	115	ac	$500.00	$57,500.00
		Subtotal		**$20,921,123.65**
Embankment				
excavate and haul	65,290	cy	$5.75	$375,417.50
Dust control	8	days	$735.00	$5,880.00
Erosion protection (stormwater runoff control)	500	cy	$7.50	$3,750.00
Revegetation	2	ac	$500.00	$1,000.00
		Subtotal		**$386,047.50**
Wetland				
Place fill for trackhoe access	3,040	cy	$4.80	$14,592.00
Excavate and haul to treatment/loadout	13,440	cy	$5.75	$77,280.00
Wetland restoration	10,365	cy	$10.00	$103,650.00
Silver Creek diversion	500	cy	$7.50	$3,750.00
		Subtotal		**$199,272.00**
Stabilization and Disposal - Onsite				
Dust control	60	days	$735.00	$44,100.00
Erosion protection (stormwater runoff control)	1,000	cy	$7.50	$7,500.00
Stabilization	2,980,988	cy	$30.00	$89,429,640.00
Load to trucks, haul to impoundment	4,471,482	cy	$1.50	$6,707,223.00
Sample analysis	250	sample	$150.00	$37,500.00
		Subtotal		**$96,225,963.00**
Long-Term Operation and Maintenance Costs				
O&M	15	yr	$4,000.00	$60,000.00
Annual Sampling	15	yr	$2,000.00	$30,000.00
Reporting	15	yr	$5,000.00	$75,000.00
Develop Institutional Controls	1		$10,000.00	$10,000.00
Institutional Controls Monitoring and Repair	15	yr	$2,000.00	$30,000.00
		Subtotal		**$205,000.00**
			Total Direct Costs	**$121,902,705.25**
Indirect Capital Costs				
Engineering Design and Project Administration				$50,000.00
Monitoring Plan				$4,000.00
Construction Oversight (2.5 % of Direct Capital Cost)				$3,047,567.63
Contingency (15 % of Direct Capital Cost)				$18,285,405.79
Health and Safety (1 % of Capital Costs)				$1,219,027.05
EPA Oversight				$200,000.00
		Subtotal		**$22,806,000.47**
			Total Indirect Costs	**$22,806,000.47**
TOTAL COSTS				**$144,708,705.72**

Table13-4
Cost Alternative 3
Source Removal/ Soil Cover and Wedge Buttress

Direct Capital Costs	Quantity	Unit	Cost	Total Cost
Diversion Ditch				
Place 1' gravel cover	956	cyd	$12.00	$11,472.00
Signs	20	sign	$50.00	$1,000.00
		Subtotal		**$12,472.00**
Tailings South of Diversion Ditch				
Site preparation (clearing, grubbing..)	50	ac	$1,000.00	$50,000.00
Excavate and haul to impoundment (partial source removal)	178,266	cy	$5.75	$1,025,029.50
Place soil cover (bring up to 12", haul, spread, compact)	27,492	cy	$4.80	$131,961.60
Place topsoil (.5') excavated and covered areas	40,062	cy	$4.80	$192,297.60
Dust control	20	days	$735.00	$14,700.00
Reconstruct tributary channel	1,481	cy	$7.50	$11,107.50
Grading (stormwater runoff control)	24	hrs	$140.00	$3,360.00
Revegetation	50	ac	$500.00	$25,000.00
		Subtotal		**$1,453,456.20**
Wetland				
Place fill for trackhoe access	3,040	cy	$4.80	$14,592.00
Excavate and haul to impoundment	13,440	cy	$5.75	$77,280.00
Restoration	10,400	cy	$10.00	$104,000.00
Silver Creek diversion	500	cy	$7.50	$3,750.00
Revegetation	7	ac	$500.00	$3,250.00
		Subtotal		**$202,872.00**
Impoundment				
Site preparation (clearing, grubbing..)	115	ac	$1,000.00	$115,000.00
Place tailings from TSDD and Wetland (grade and compact)	191,742	cy	$1.50	$287,613.00
Place soil cover (bring up to 12", haul, spread, compact)	136,853	cy	$4.80	$656,894.40
Construct drainage channel (to SDD)	1,556	cy	$7.50	$11,670.00
Place topsoil (.5')	79,216	cy	$4.80	$380,246.40
Dust control	20	days	$735.00	$14,700.00
Grading (stormwater runoff control)	80	hrs	$140.00	$11,200.00
revegetation	115	ac	$500.00	$57,500.00
		Subtotal		**$1,534,823.80**
Embankment (wedge buttress)				
Site preparation (clearing, grubbing..)	0.75	ac	$1,000.00	$750.00
Place drain material	1,210	cy	$8.00	$9,680.00
Place buttress material (includes compaction of lifts)	7,200	cy	$6.00	$43,200.00
Dust control	6	days	$735.00	$4,410.00
Erosion protection (stormwater runoff control)	300	cy	$7.50	$2,250.00
Revegetation	0.75	ac	$750.00	$562.50
		Subtotal		**$60,852.50**
Long-Term Operation and Maintenance Costs				
O&M	15	yr	$4,000.00	$60,000.00
Annual Sampling	15	yr	$2,000.00	$30,000.00
Reporting	15	yr	$5,000.00	$75,000.00
Develop Institutional Controls	1		$5,000.00	$5,000.00
Institutional Controls Monitoring and Repair (fencing, signs)	15	yr	$5,000.00	$75,000.00
		Subtotal		**$245,000.00**
			Total Direct Costs	**$3,509,476.50**
Indirect Capital Costs				
Engineering Design and Project Administration				$50,000.00
Monitoring Plan				$4,000.00
Construction Oversight (2.5 % of Direct Capital Cost)				$87,736.91
Contingency (15 % of Direct Capital Cost)				$526,421.48
Health and Safety (1 % of Capital Costs)				$35,094.77
EPA Oversight				$50,000.00
		Subtotal		**$753,253.15**
			Total Indirect Costs	**$753,253.15**
TOTAL COSTS				**$4,262,729.65**

APPENDIX C

RESPONSIVENESS SUMMARY

1.1 Stakeholder Issues and EPA Responses

During the Public Comment Period for the Proposed Plan, comments were received from UPCM, the Marsac Corridor Association and Utah Department of Fish and Wildlife. Their comments and EPA's response to these comments are in the following sections.

1.1.2 Comments Received From United Park City Mines

Remedy Selection. United Park supports the remedy selected in the Proposed Plan. Like EPA, United Park believes that Alternative 3 provides more than adequate protection of human health and the environment, will prove to be effective (both in the long and short terms), will be cost-effective, and will otherwise address the remaining environmental conditions necessary to achieve final closure of the Site.

Possible Wetlands Operable Unit. The Proposed Plan states that the timing of remediation as to the small wetland area between the impoundment and Silver Creek will be delayed until upstream remediation and reclamation efforts are complete. United Park's understanding is that the wetland area will be remediated following remediation of several upstream areas, some of which are located on United Park property. In any event, because the timing for the remediation of the wet)and area will not be linked to the remediation process for the remainder of the Site, United Park suggests that EPA consider designating the wetland area as a separate operable unit. EPA has the discretion to designate multiple operable units with respect to the Site. Doing so here makes sense in part because it will facilitate negotiation of the anticipated Consent Decree, enabling EPA and United Park to define construction completion as to each operable unit.

EPA Response: While EPA understands this is an option that would allow the Site to be archived by OU more quickly, EPA feels strongly that the timing of cleanup throughout the Watershed will work to everyone's advantage. By cleaning up the upstream sites along Silver Creek in a time efficient manner, the Site wetlands can then be excavated according to the plan set forth in this ROD. It is critical to EPA that the entire Silver Creek Watershed be addressed and by further dividing sites by OU or through some other approach, EPA believes this will slow the process down rather that expedite it.

Site Impacts on Silver Creek. There are a number of statements in the Proposed Plan suggesting that the Site is presently having a significant impact on water quality in Silver Creek. See page A-2 (first paragraph) (linking Site to other sites that are all impacting Silver Creek); page A-3 and A-4 (remediation of Site will play direct role in watershed remediation), United Park finds these statements confusing. The Remedial Investigation ("RI") for the Site determined that surface waters leaving the Site present no significant impact on water quality in Silver Creek. While it is true that surface waters in areas upstream of the south diversion ditch exhibit elevated metal concentrations, the water in the south diversion ditch outfall has consistently met surface water quality standards. The remedial action proposed for the Site is more appropriate)y described at addressing *potential future* impacts the Site may have on Silver Creek. While

United Park recognizes that many of the issues addressing Silver Creek arose generally from historic mining operations, United Park believes it is inappropriate to group the Site with other areas in the Silver Creek Watershed that may have actual present impacts on water quality in Silver Creek.

EPA Response: EPA recognizes that the data from the Remedial Investigation relating to the Site's impact on Silver Creek support this statement. It was written in the Proposed Plan that historic mining activities throughout the Upper Silver Creek Watershed have adversely affected Silver Creek In Section 12, The Selected Remedy, and in Section 5, Summary of Site Characteristics, it is made clear that water from the Site that enters Silver Creek is of better quality than Silver Creek itself. It is accurate to state that the selected remedy will be protective of human health and the environment in that it will minimize any future exposures or impacts contamination at the Site may present.

Human and Ecological Risks. United Park believes that the Proposed Plan mischaracterizes the results and findings of the human health and ecological risk assessments relating to the Site. More specifically, the discussion in the Proposed Plan under Human Health Risks (page A-4) states that "if the necessary cleanup action is not taken... there is a risk to future recreational users at the Site because of lead and arsenic present in the tailings." In fact, the Baseline Human Health Risk Assessment ("BHHRA") conducted by EPA concluded no significant risk to recreational users of the Site from the existing soils and mine tailings unless the soil cover is somehow disturbed. With respect to the ecological risk assessment discussion, the Proposed Plan states that the Ecological Risk Assessment ("ERA") determined that ecological receptors are potentially exposed to metals in several ways, as summarized in the chart on page A-4 of the Proposed Plan. It would be more accurate te state that the ERA concluded contaminated sediment in the wetland area is the primary ecological risk driver, although surface water in a portion of the south diversion ditch may also present some risk, to a lesser degree. This conclusion is supported by Table 7-8 in the ERA.

EPA Response: Again, if is EPA 's intent to make it clear that if the necessary remedial actions are not taken at the Site, which include both enhancing the soil cover and ensuring that it will remain intact in the future, potential risks to human health and the environment exist. EPA agrees with the comment addressing sediments as the primary risk driver at the Site.

Future Consolidation of Material. United Park understands the practical benefits that could arise from the future use of the Site as a consolidation area for mining materials and impacted soils. However, United Park notes the potential complications related to defining completion of construction for purposes of the remedial action described in the Proposed Plan. United Park suggests that one way to address this concern would be for EPA to provide in the ROD that: (i) any materials so consolidated at the Site during implementation of the remedial action will simply be incorporated into the remedial action and covered with the required amount of clean cover material and revegetated; and (ii) any material to be consolidated after completion of construction will be subject to institutional controls requiring that mine wastes or impacted soils consolidated at the Site after the remedial action is completed would be covered with the required amount of clean material and revegetated. This will allow United Park to achieve a state of completion with the remediation while providing maximum flexibility for the future consolidation of material from the Watershed and any potential reuse of the property.

EPA Response: EPA agrees with this comment; evidence of incorporation of this comment into the ROD can be found in the Remedy Selection section.

1.1.3 Comments Received from the Marsac Corridor Association

One component of the remedy allows for waste to be transported from Empire Canyon and deposited at Richardson Flat. The Marsac Corridor Association (MCA) is a group of homeowners that live in the neighborhood through which trucks carrying the waste would drive. The members of the MCA had two specific comments: 1) The waste in Empire Canyon should be left in place, and 2) If the waste must be moved, it should be transported up the Mine Road and down Royal Street, rather than using only the Mine Road and Lower Marsac.

EPA Response: EPA understands MCA 's concerns and has considered its comments. It is our perspective that the waste may be left in place or moved to Richardson Flat. Factors such as space to contain the waste, the cost of transportation, and potential migration of waste left in place will be considered by the parties involved in order to make a decision about the fate of the waste in Empire Canyon. EPA understands that this is a local issue and one that will be resolved through discussion and consideration amongst the stakeholders. These stakeholders include Park City, UPCM MCA and other concerned public. A public hearing will be held by Park City in the upcoming future to resolve this issue.

1.1.4 Comments Received from United States Fish and Wildlife Service (the Service) Utah Field Office

The Service submitted comments concerning the remedy's protectiveness in relation to ecological receptors at the Site. The Service's primary concern is that the sediments found in the South Diversion Ditch, the pond at its terminus and in the wetland at the base of the embankment are not being addressed in a manner efficient enough to substantially minimize risk to ecological receptors at the site. The Service proposes excavation of the sediments in all three areas.

EPA Response: The sediments within the wetland area will be excavated and placed within the impoundment through the selected remedy. EPA understands that the wetland is a naturally occurring ecological phenomenon that existed before the impoundment was created. Therefore, the remedy should allow for the restoration of the wetland as a habitat for ecological receptors at the Site. However, the diversion ditch and small pond are engineered features at the site that were constructed to help contain the tailings in the impoundment and minimize groundwater infiltration from Area B info the main impoundment. Therefore, these areas will be sufficiently remediated through the described mechanisms (placement of 18 inches of gravel over contaminated sediments). While this action does not create habitat or restore habitat, if will minimize risk to ecological receptors at the Site. The requirements set forth in the NCP are met. Lastly, this does not preclude continued negotiation concerning the restoration of these features between UPCM and EPA surrounding Natural Resource Damages. These damages are currently being addressed and they are a complicated issue. It is possible these damages could be mitigated through the restoration of other areas within the Watershed. So, until a settlement concerning these damages has been reached the exposure pathways will be interrupted with gravel and risk to ecological receptors will be minimized in the diversion ditch and the pond at its terminus as it is described in the selected remedy.